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Commentary and Perspective, data tables, additional images, video clips and/or translated abstracts are available for this article. This information can be accessed at <http://www.ejbjs.org/cgi/content/full/91/10/2395/DC1>

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Quality of Life During Orthopaedic Training and Academic Practice

Part 1: Orthopaedic Surgery Residents and Faculty

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Investigation performed at the Department of Orthopaedic Surgery, Washington University School of Medicine, St. Louis, Missouri, and the Department of Orthopaedic Surgery, Johns Hopkins University School of Medicine, Baltimore, Maryland

Background: A pilot study of two academic training programs revealed concerning levels of resident burnout and psychological dysfunction. The purpose of the present study was to determine the quality of life of orthopaedic residents and faculty on a national scale and to identify risk factors for decompensation.

Methods: Three hundred and eighty-four orthopaedic residents and 264 full-time orthopaedic faculty members completed a voluntary, anonymous survey consisting of three validated instruments (the Maslach Burnout Inventory, the General Health Questionnaire-12, and the Revised Dyadic Adjustment Scale) and question sets assessing demographic information, relationship issues, stress reactions/management, and work/life balance.

Results: High levels of burnout were seen in 56% of the residents and 28% of the faculty members. Burnout risk was greatest among second-postgraduate-year residents and residents in training programs with six or more residents per postgraduate year. Sixteen percent of residents and 19% of faculty members reported symptoms of psychological distress. Sleep deprivation was common among the residents and correlated positively with every distress measure. Faculty reported greater levels of stress but greater satisfaction with work and work/life balance. A number of factors, such as making time for hobbies and limiting alcohol use, correlated with decreased dysfunction for both residents and faculty.

Conclusions: Despite reporting high levels of job satisfaction, orthopaedic residents and faculty are at risk for burnout and distress. Identification of protective factors and risk factors may provide guidance to improve the quality of life of academic orthopaedic surgeons in training and beyond.

Residency training, particularly in a surgical discipline, is an arduous, demanding undertaking. Physicians in training are often subject to prolonged sleep deprivation, high job demands, and stress. They frequently have little control over their work schedules and tasks. Adverse effects of this system on patient care, patient safety, and resident well-being have been widely reported¹⁻⁵. Elevated rates of depression, chronic anger, cynicism, drug abuse, loneliness, marital disruption, cognitive impairment, and suicidal thoughts or actions have been noted among residents^{5,6}.

The negative impact of working conditions on well-being and psychological functioning is not limited to residents. Practicing physicians have also been found to be at risk for psychological distress^{7,8}.

In addition to general assessments of psychiatric morbidity, a number of researchers have focused on the work-related distress syndrome of burnout among physicians and residents in a variety of fields^{7,9-15}. Burnout, as defined by Maslach et al., is a syndrome of emotional exhaustion, depersonalization, and reduced sense of personal accomplishment occurring in individuals who work in human services¹⁶. Factors identified as contributing to burnout include work overload, lack of control, insufficient rewards, lack of a sense of community, lack of fairness, and conflicting values¹⁷. In contrast, high levels of job satisfaction appear to protect one's mental health against job stress⁷.

Burnout has negative consequences for both the individual and the employer¹⁸. For the individual worker, high

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burnout scores have been associated with physical illness, including increased risk of cardiovascular disease, male infertility, Type-2 diabetes mellitus, emotional illness, and elevated rates of substance abuse^{9,18}. Consequences for the employer or institution include increased employee turnover, absenteeism, poor job performance, and negative attitudes⁹. Among medical professionals, high levels of burnout correlate with poor performance and decreased quality of medical care, and, among residents, they correlate with an increased risk of patient care errors^{19,20}.

In a similar vein, the quality of life of an individual impacts the quality of service provided by that individual²¹. For our purposes, we understand quality of life to be the summation of the individual's psychological functioning, emotional resiliency, and satisfaction with work, home life, and interpersonal relationships.

In an effort to assess the quality of life, stress, and coping of orthopaedic surgery residents, we performed a pilot study of residents at one large academic program and faculty at two large academic programs²². That study revealed concerning levels of burnout and psychological dysfunction among orthopaedic surgery residents. The faculty appeared to be coping well, with significantly lower levels of burnout and psychological dysfunction. The majority of subjects in both the resident and faculty groups appeared to have low levels of distress in their relationships with their significant others. We repeated the pilot study following the implementation of the Accreditation Council for Graduate Medical Education (ACGME) resident work-hour restriction policy and found some improvement in resident functioning²³. Among the residents, we noted a decrease in psychological distress, an increased sense of personal accomplishment, a trend toward decreased emotional exhaustion, and a possible trend toward decreased depersonalization. No significant changes were identified among the faculty.

On the basis of those results, we conducted a nationwide survey to determine the quality of life of orthopaedic residents, faculty, and their spouses or significant others. Correlations were assessed to identify risk factors for decompensation. We hypothesized that orthopaedic surgery residents remain at a greater risk for burnout and psychological distress than do their faculty, despite the implementation of the ACGME resident duty-hour restrictions. We also sought to identify correlations between individual traits or program size and higher rates of stress, burnout, and psychological decompensation.

Materials and Methods

Participants

Following review and approval of our project by the institutional review board at our lead institution, the study protocol was presented to the national meeting of the Association of Residency Coordinators in Orthopaedic Surgery (ARCOS) and the 105 member institutions were invited to participate. Sixty-four ACGME-accredited orthopaedic surgery resident training programs elected to participate. Participating programs reported their current number of active residents and full-time faculty. One thousand four hundred

and sixteen resident surveys and 1153 faculty surveys were forwarded to the training programs, along with instructions to administer them in an anonymous, voluntary fashion. Each participant received a random code number, confidentially recorded by the study administrator (R.L.B.).

Survey Instrument

Participants completed a 119-question survey tailored to either resident or faculty surgeons. The survey instrument consists of six sections, including three validated instruments as well as novel question sets. Section 1 contained background and demographic information (see Appendix). Section 2 assessed burnout with use of the Maslach Burnout Inventory, a twenty-two-question validated instrument¹⁶ that evaluates three subscales of burnout: emotional exhaustion, depersonalization, and sense of personal achievement. Emotional exhaustion refers to a drained, depleted feeling due to excessive psychological and emotional demands. Depersonalization refers to a tendency to view others in an excessively detached, impersonal, cynical manner. Personal achievement refers to a sense of competence or accomplishment. Scores were compiled for each subscale in accordance with the norms developed from the responses of a sample of 1104 American medical doctors and nurses¹⁶. Within the Maslach Burnout Inventory construct, emotional exhaustion and depersonalization correlate with burnout, whereas personal achievement is inversely proportional to burnout¹⁶ (see Appendix).

Section 3 measured psychological morbidity with use of the General Health Questionnaire-12 (GHQ-12), a validated, widely used mental disorder screening instrument²⁴. Scores of ≥ 4 have been found to be indicative of depression, social dysfunction, anxiety, and somatic symptoms^{25,26} (see Appendix).

Section 4 consisted of subjective ratings of satisfaction and stress, both at home as well as at work. It included questions identifying specific stressors (e.g., sleep deprivation, financial concerns, and relationships with staff) in addition to questions regarding perceptions of harassment, discrimination, and satisfaction (see Appendix). Section 5 assessed self-care and stress management strategies (see Appendix).

Section 6 pertained to relationship functioning and was completed by participants who were married or in ongoing committed relationships. It consisted of the fourteen-item Revised Dyadic Adjustment Scale and fifteen questions regarding work/life balance. The Revised Dyadic Adjustment Scale is a validated instrument assessing marital adjustment on a 69-point scale²⁷. A score of ≤ 46 is considered to reflect a distressed relationship²⁷ (see Appendix).

Statistical Analysis

Statistical analysis was performed on all completed questionnaires. Partially completed questionnaires were included according to the sections completed. Incomplete summary measures were not included. Descriptive statistics and pairwise correlations were computed. The simple correlation coefficient was used to estimate the strength of, and to test the significance

TABLE I Demographic Characteristics of Responding Residents and Faculty

	Residents (N = 384)	Faculty (N = 264)
Sex		
Female	45 (12%)	20 (8%)
Male	339 (88%)	244 (92%)
Marital status		
Married*	64% (mean, 4.4 yr)	86% (mean, 19.4 yr)
Cohabiting with significant other	7%	2%
Single	25%	7%
Divorced	0.5%	3%
No response	3.5%	2%

*The mean length of time for which the respondents had been married is given in parentheses.

of, bivariate relationships. Pearson and nonparametric Spearman correlations were computed, and similar results were obtained with use of the two methods. Simple t tests were used to compare mean responses on standardized scales. Analysis-of-variance techniques were used to compare more than two groups. The Duncan multiple comparisons test was used to identify significantly different pairs when the overall F test was significant. Differences generating p values of <0.05 were considered significant, whereas those generating p values of between 0.05 and 0.1 were considered to suggest a trend.

Source of Funding

The funds received from the Orthopaedic Research and Education Foundation (OREF) were used to cover the administrative costs of performing the national survey, data entry, and statistical analysis.

Results

Three hundred and eighty-four orthopaedic residents and 264 full-time orthopaedic faculty from sixty-four orthopaedic surgery programs completed the survey. The response rates were 27% for the residents and 24% for the faculty, and 1.3% to 3.1% of the residents and 0.4% to 2.3% of the faculty

had missing values for their psychological measures. For incomplete surveys, the sections that were complete were included and those with missing values were excluded.

Demographics

Demographic characteristics of the respondents are presented in Table I.

Work Hours and Sleep Deprivation

Residents reported working an average (and standard deviation) of 70.24 ± 20.39 hours per week. Postgraduate-year-two (PGY-2) residents worked significantly more hours than the resident mean ($p < 0.05$) (Table II). PGY-2 residents also worked significantly more hours than PGY-1, PGY-3, and PGY-5 residents did ($p < 0.05$). PGY-2 residents worked approximately five more hours per week than PGY-4 residents did, but this difference was not significant. Nine percent of the residents admitted to working more than eighty hours per week, and 5% admitted to working more than eighty-eight hours per week. Faculty reported working an average of 62.8 ± 18.2 hours per week. Seven percent of the faculty worked more than eighty hours per week, and 1% worked more than eighty-eight hours per week.

TABLE II Number of Hours Worked Per Week According to Year Level

Year Level*	No. of Hours Worked Per Week†	Difference from Overall Mean (hr)	P Value
PG-1	65.94 ± 26.35	-4.3	0.37
PG-2	76.22 ± 17.66	+6.0	0.02
PG-3	67.37 ± 25.46	-2.9	0.33
PG-4	71.24 ± 14.48	+1.0	0.61
PG-5	68.72 ± 17.85	-1.5	0.50
Overall	70.24 ± 20.39		

*PG-1 through PG-5 refer to the first through fifth postgraduate years; for example, PG-1 refers to a first-year resident. †The values are given as the mean and the standard deviation.

Variations in Resident Burnout and Psychological Distress across Residency Training Years

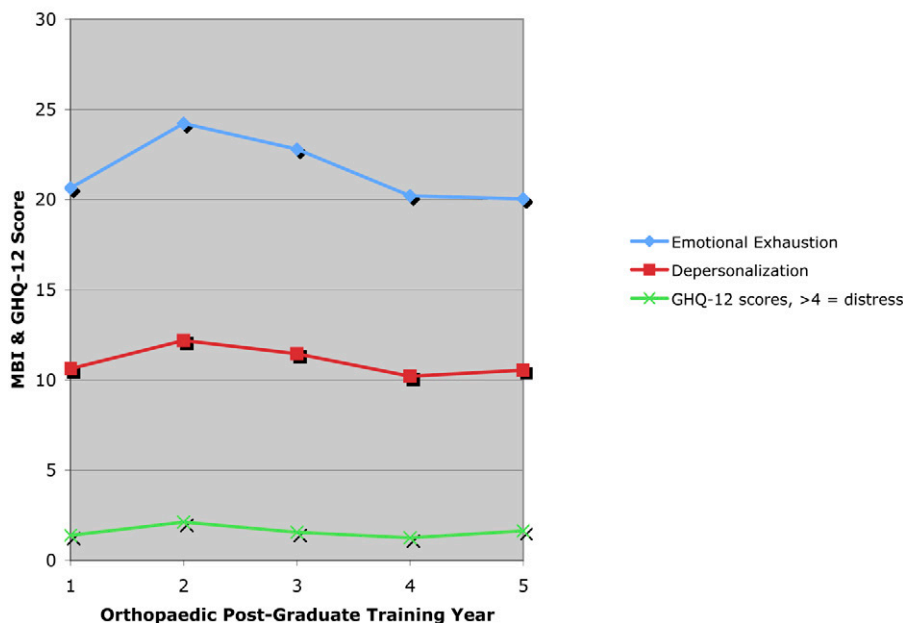


Fig. 1
Line graph illustrating variations in resident burnout and psychological distress across residency training years. MBI = Maslach Burnout Inventory, and GHQ-12 = General Health Questionnaire-12.

When asked to rate their degree of sleep deprivation, 45.2% of the residents reported “A little,” 30.2% reported “Quite a bit,” and 16.6% reported “A lot.” All measures of distress correlated with increases in sleep deprivation for residents: increased emotional exhaustion ($p < 0.0001$), increased depersonalization ($p < 0.0001$), lowered personal achievement ($p < 0.0001$), increased psychological distress ($p < 0.0001$), and lowered marital satisfaction ($p < 0.0001$). Residents reported significantly greater levels of sleep deprivation than did faculty ($p < 0.0001$).

Among faculty, 21% reported no sleep deprivation, 48% reported “A little,” 23% reported “Quite a bit,” and 8% reported “A lot.” For faculty, increases in sleep deprivation correlated positively with increases in emotional exhaustion ($p < 0.0001$), depersonalization ($p < 0.0001$), and psychological distress ($p < 0.0001$), along with lowered marital satisfaction ($p < 0.0005$). Personal achievement was unaffected by sleep deprivation for faculty.

Job Satisfaction

Eighty percent of residents and 88% of faculty reported that they believed the sacrifices required for a life in medicine to be worthwhile. Ninety-three percent of the respondents in both groups reported that they would choose orthopaedics as their specialty if they had the opportunity to choose again. However, 23% of residents and 15% of faculty stated that they would not choose medicine as a career if they had the opportunity to choose again.

Faculty reported significantly higher levels of satisfaction with life in orthopaedics than residents did ($p < 0.0001$). Re-

garding life as an orthopaedic resident, 21% reported being extremely satisfied, 48% of residents reported being fairly satisfied, 7.3% reported being somewhat satisfied, 4.4% reported being fairly dissatisfied, and, 0.3% reported being extremely dissatisfied. Among the faculty, 54% reported being extremely satisfied with life as an orthopaedic surgeon, 31% reported being fairly satisfied, 1.5% reported being somewhat satisfied, 1.9% reported being fairly dissatisfied, and none reported being extremely dissatisfied.

Burnout

Thirty-two percent of the residents and 28.4% of the faculty scored in the high range of emotional exhaustion ($p < 0.04$). Fifty-six percent of the residents and 24.8% of the faculty scored in the high range of depersonalization ($p < 0.0001$). Eighteen percent of the residents and 10% of the faculty scored in the low range of personal accomplishment ($p < 0.0085$).

Residents showed significantly higher levels of emotional exhaustion and depersonalization than their faculty did ($p < 0.04$ and $p < 0.0001$, respectively), and the sense of personal accomplishment among the residents was significantly lower than that among the faculty ($p < 0.0002$).

Psychological Distress

Sixteen percent of the residents and 19% of the faculty scored within the symptomatic range (with a score of ≥ 4) on the GHQ-12. We could not identify any significant difference between levels of psychiatric symptomatology for residents and faculty.

Mentor Characteristics

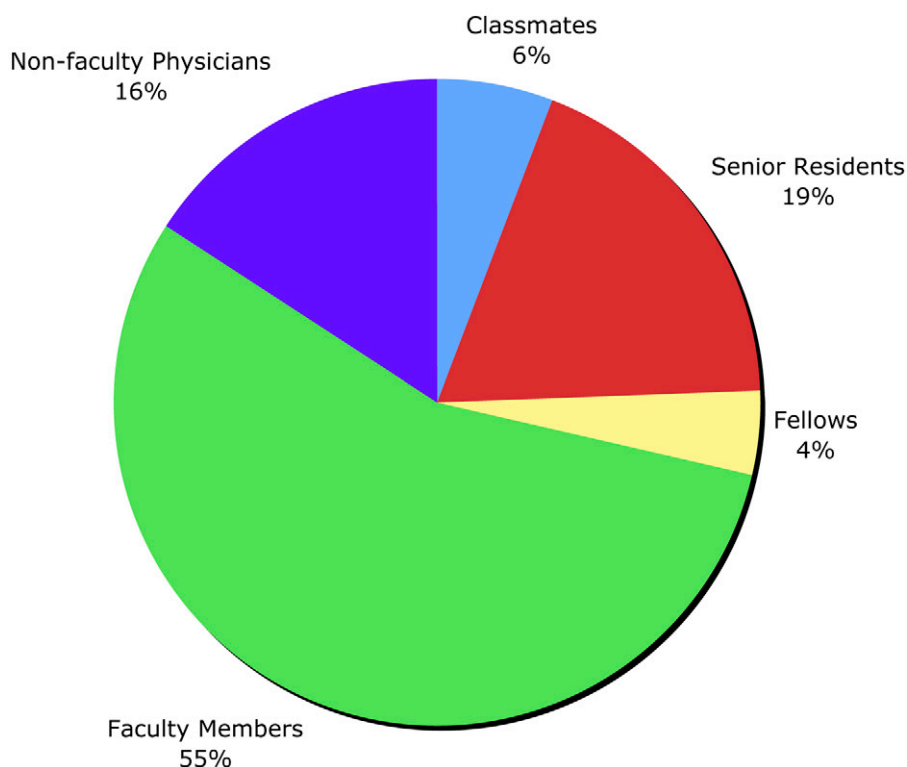


Fig. 2
Pie chart illustrating mentor characteristics.

Marriage and Family Life

Two hundred and seventy three residents (71%) and 232 faculty (88%) reported being married or in a committed, long-term relationship (Table I). Seventy-seven percent of the faculty and 86% of the residents scored above the distressed range on the Revised Dyadic Adjustment Scale, revealing adequate levels of marital adjustment. No significant difference was identified between residents and faculty in terms of the total Revised Dyadic Adjustment Scale score.

Among residents, being married was associated with lower emotional exhaustion ($p < 0.04$). Among married residents, higher Revised Dyadic Adjustment Scale scores were correlated with a greater sense of personal achievement ($p < 0.0002$) and lower GHQ-12 scores ($p < 0.008$).

Among faculty, there was no significant difference in burnout or psychological distress between those who were married and those who were single. However, among married faculty, higher total Revised Dyadic Adjustment Scale scores were correlated strongly with lower emotional exhaustion ($p < 0.0003$), lower depersonalization ($p < 0.0046$), higher personal achievement ($p < 0.0001$), and lower GHQ-12 scores ($p < 0.0001$).

Work/Life Balance

Regarding the balance between work demands and personal life needs, the faculty reported higher satisfaction with overall

work/life balance ($p < 0.0001$). Thirty percent of residents were somewhat to extremely dissatisfied with that balance, whereas only 17% of faculty were somewhat to extremely dissatisfied ($p < 0.0001$). Residents reported higher levels of work/life conflicts ($p < 0.0046$), reported that work interfered with home life more often ($p < 0.0007$), and reported that they were more often too tired ($p < 0.0001$) or irritable ($p < 0.0003$) after work to participate in home life than did faculty.

Stress and Stress Management

Interestingly, compared with residents, faculty reported higher levels of stress ($p < 0.0001$) and indicated having more difficulty leaving personal concerns behind when at work ($p < 0.0001$).

Residents reported exercising less frequently than faculty did: 41% of residents reported exercising three to five times per week, whereas 54% of faculty did so ($p < 0.002$). Exercise may offer some psychological protection: respondents who never exercised had the highest GHQ-12 scores, and, for both groups, exercise frequency correlated with diminished levels of psychological distress ($p < 0.003$ for residents, $p < 0.01$ for faculty).

Fifty-eight percent of the respondents in both groups reported that they made time for hobbies weekly or more often. The frequency of participation in hobbies correlated with diminished levels of psychological symptomatology ($p < 0.01$ for residents, $p < 0.0001$ for faculty) and with increased

TABLE III Risk Factors for Residents*

Has high level of sleep deprivation
Has high level of work/life conflict
Interrupts work with personal concerns
Has high levels of anger, loneliness, or anxiety
Is stressed by relationships at work
Is anxious about own competency
Has problems "unplugging" after work
Uses alcohol regularly and worries about it
Comes home too tired or irritable to enjoy home life
Worries about work when at home
Frequently feels torn between work and personal life

*The listed risk factors correlate with increased burnout and diminished marital happiness ($p \leq 0.05$).

levels of marital satisfaction ($p < 0.001$ for residents, $p < 0.0002$ for faculty). Faculty showed the additional benefit of diminished levels of emotional exhaustion ($p < 0.02$) and higher levels of personal achievement ($p < 0.0001$).

Variations Across Residency Years

Comparisons between the residency years revealed significant fluctuations in levels of emotional exhaustion, depersonalization, and psychological distress over the course of a five-year residency, with all factors peaking during the PGY-2 year (Fig. 1). Comparisons of residents from different years of training indicated no significant differences in the levels of personal accomplishment or relationship satisfaction as measured with the Revised Dyadic Adjustment Scale.

Variations Across Faculty Career Progression

One-third of faculty residents had graduated from residency within the previous ten years. This group was compared with faculty who had been in practice for more than ten years. Recent graduates (those in practice for less than ten years) reported higher levels of psychological dysfunction as measured with the GHQ-12 ($p < 0.048$). As years in practice and age advanced, significant decreases were noted in the burnout scales of emotional exhaustion ($p < 0.0005$) and depersonalization ($p < 0.0006$) as well as in the levels of psychiatric symptoms as measured with the GHQ-12 ($p < 0.02$). Revised Dyadic Adjustment Scale scores increased as years in practice advanced ($p < 0.03$).

Variations Between Large and Small Residency Programs

Large residency programs were defined as those admitting six residents or more each year, and small residency programs were defined as those admitting fewer than six residents each year.

Residents

Compared with their peers from smaller programs, residents from larger programs demonstrated significantly higher levels

of emotional exhaustion ($p < 0.008$) and depersonalization ($p < 0.0005$), indicated higher levels of stress ($p < 0.001$) and anger ($p < 0.01$), and claimed to come home from work irritable more often ($p < 0.04$). Residents from larger programs also reported more worry about "whether I will make enough money" to attain lifestyle goals ($p < 0.002$). However, their self-ratings indicated that residents from larger programs felt less "conflict between my work and non-work lives" ($p < 0.0005$).

Compared with residents in larger programs, those in smaller programs drew more on religion or faith in God for strength ($p < 0.01$) and attended worship services more often ($p < 0.008$). They also indicated being more likely to seek individual counseling or therapy ($p < 0.04$). More residents in smaller programs believed that their program facilitated their mates' adjustment to work/life issues ($p < 0.0001$). They reported higher levels of satisfaction with their overall work/life balance ($p < 0.03$), reported less conflict about being "torn between demands of work and our personal life" ($p < 0.01$), and were less likely to believe that "younger physicians...are attempting or demanding a level of work/life balance that is unrealistic" ($p < 0.04$).

Faculty

Compared with their peers in smaller programs, faculty in larger programs more frequently reported that their work schedule ($p < 0.005$) and their mates' work schedule conflicted with their family life ($p < 0.05$). In addition, they reported coming home irritable from work more often ($p < 0.009$) and were more likely to have sought marriage counseling ($p < 0.04$).

Mentors

Two hundred and twenty-nine residents (60%) reported having at least one mentor, and many claimed to have more than one type, for a total of 351 reported mentors of various types (Fig. 2). However, >75% reported speaking with their mentors

TABLE IV Resident Protective Factors*

Leaves personal concerns out of workplace
Perceives support from other medical families
Has an in-program mentor
Speaks frequently with mentor
Draws on religion or faith
Makes time for exercise
Makes time for hobbies
Takes non-work-related vacations
Has low levels of alcohol use
Makes time regularly to be alone with mate
Has high overall satisfaction with life in medicine
Perceives help from program for mate's adjustment

*The listed protective factors correlate with decreased burnout and increased marital happiness ($p \leq 0.05$).

TABLE V Faculty Protective Factors*

Leaves personal concerns out of workplace
Perceives support from other medical families
Has a colleague mentor
Perceives work environment to be supportive
Meditates
Makes time for exercise
Participates in hobbies frequently
Has low levels of alcohol use
Makes time regularly to be alone with mate
Belongs to national specialty organization

*The listed protective factors correlate with decreased burnout and increased marital happiness ($p \leq 0.05$).

“never” (32.3%) or only “several times a year” (44.4%). As the frequency of contact with mentors increased, emotional exhaustion diminished ($p < 0.0001$) and personal achievement increased ($p < 0.006$). For those who found it helpful to speak with their mentors, increased levels of personal achievement ($p < 0.03$) and significantly lower levels of emotional exhaustion ($p < 0.003$) and depersonalization ($p < 0.02$) were noted.

The type of mentor seemed to matter. Having a senior resident or classmate mentor correlated with lower emotional exhaustion ($p < 0.04$ for senior resident mentor, $p < 0.05$ for classmate mentor), and having a classmate or faculty member mentor correlated with increased personal achievement ($p < 0.03$ for classmate mentor, $p < 0.003$ for faculty member mentor). Having a senior resident as a mentor correlated with increased marital satisfaction scores ($p < 0.03$). In contrast, having a fellow or a physician other than a faculty member as a mentor yielded the least positive impact on measured levels of burnout and marital satisfaction.

Support

Compared with faculty, residents perceived significantly more support from other medical families ($p < 0.0001$) and were significantly more likely to seek support from colleagues ($p < 0.0001$) and from their mates ($p < 0.006$). Fifty-seven percent of residents stated that they spoke with colleagues informally about their concerns “Quite a bit” (42.1%) or “A lot” (14.7%). The majority of the residents stated that they “talk to my partner/family/friends about my concerns” “Quite a bit” (40.4%) or “A lot” (36.6%). Talking with partners, family, friends, and colleagues informally about work concerns correlated significantly with increased Revised Dyadic Adjustment Scale marital satisfaction scores ($p < 0.0005$) but did not appear to affect measured levels of burnout or psychiatric symptoms.

Additional Risk and Protective Factors

An examination of our results revealed a number of additional risk factors for residents that correlated with increased burn-

out and decreased marital happiness. These risk factors are reported in Table III along with a summary of the correlations described above. Protective factors associated with decreased burnout and increased marital happiness for residents and faculty are reported in Tables IV and V, respectively.

Discussion

The present report describes what we believe to be the first national study in the United States to examine job stress and satisfaction, relationship quality, and psychological functioning of orthopaedic residents and faculty.

Our findings are limited by a low response rate. Such rates are, unfortunately, common in medical education research and are consistent with similar surveys of academic surgeons and practicing physicians²⁸⁻³⁰. Anonymous surveys and those exceeding 1000 words have particularly poor response rates from physicians^{28,31}. It has been postulated that the poor response rates noted in medical education research may be due to distrust of surveys, fear of retribution, or concerns regarding confidentiality³². Given the length of our instrument, competing demands of work may also have been a factor. Our low response rate raises concerns regarding selection bias. We are not able to determine whether individuals with high or low levels of burnout or psychological dysfunction were more likely to respond. It may be that distressed individuals were motivated to respond in the hope that the results might prompt a change that would positively affect their situation. Conversely, it is possible that individuals with high levels of emotional exhaustion and depression lacked the energy to complete the survey instrument.

While our response rate was not optimal, a considerable number of the individuals who did respond reported problems. A review of the 648 resident and faculty surveys that were submitted revealed concerning levels of burnout and psychological dysfunction as well as some interesting differences from our pilot studies.

In comparison with our initial pilot study as well as the follow-up study performed after the implementation of the work-hour restrictions, this nationwide survey revealed a modest improvement in burnout for residents but a higher level of faculty burnout^{22,23}. Roughly three of every ten orthopaedic residents and faculty showed high levels of emotional exhaustion, and more than half of the residents and a quarter of the faculty showed high levels of depersonalization.

Overall, the rate of resident burnout among our respondents was higher than that reported by Golub et al. in their national study of otolaryngology and head and neck surgery residents³³. However, the residents in that study appeared to be protected by their high level of personal accomplishment, and the authors noted that a decline in personal achievement would result in a considerable number of residents advancing from moderate to high burnout³³. Our results are nearly identical to the findings of Gopal et al.³⁴ in their study (performed after the implementation of the work-hour restrictions) of internal medicine residents at the University of Colorado as well as the findings reported by Garza et al.¹² in their survey

of obstetrics and gynecology residents in Texas. In each of those studies, depersonalization was the burnout component that showed the greatest elevation among trainees^{12,33,34}. This finding is particularly concerning as depersonalization has been associated with lower quality of patient care²⁰.

The depersonalization rates in our resident group showed little change from those noted in our original pilot study, despite the intervening implementation of the ACGME work-hour restrictions²². Our findings are consistent with the work of Hutter et al., who found that, following the implementation of the ACGME resident work-hour restrictions, average emotional exhaustion in general surgery residents decreased from high levels to the medium range whereas depersonalization decreased slightly but remained high overall³⁵. A similar pattern of decreased emotional exhaustion but minimum or no improvement in depersonalization was demonstrated among general surgery residents by Gelfand et al.³⁶ and among internal medicine residents by both Gopal et al.³⁴ and Goitein et al.³⁷. It appears that depersonalization arises not from work volume and hours but from some other aspect of residency training not ameliorated by work-hour restrictions.

Depersonalization is not only a problem for orthopaedic trainees; elevated levels have been reported in practicing orthopaedists as well⁹. Within academic orthopaedics, rates similar to those noted in our faculty were reported by Saleh et al. in their study of orthopaedic chairmen and program directors³⁸. Perhaps the tendency of orthopaedists to discuss their patients in terms of their diagnosis (e.g., referring to patients as “the total knee” or “the femur fracture”) facilitates detachment. Additional work is needed to identify aspects of residency training or orthopaedics in general that promote this detached, cynical attitude toward patients, peers, and coworkers.

With regard to the other elements of burnout, the rates of emotional exhaustion in our faculty group corresponded with that reported by Johns and Ossoff in their national study of otolaryngology chairmen¹³. Interestingly, that study demonstrated that 47% of the otolaryngology chairmen displayed low scores in personal achievement, whereas only 10.3% of respondents in our faculty group showed similarly low levels. Also, our faculty group scored better in all burnout parameters in comparison with the transplant surgeons surveyed by Bertges Yost et al.¹⁰. Saleh et al. reported high levels of emotional exhaustion in approximately 40% of the orthopaedic surgery chairmen and program directors whom they surveyed³⁸. These rates are significantly higher than those found in our faculty group, suggesting that faculty in leadership and administrative positions in academic orthopaedics are at particular risk for burnout.

Younger age has been associated with an increased risk of burnout among practicing surgeons⁹, obstetrics and gynecology chairmen¹¹, and transplant surgeons¹⁰. Among our respondents, younger faculty and those in practice for less than ten years showed higher levels of both burnout and psychological dysfunction. Similar decreases in burnout with advancing age and years of experience have been noted in studies of nonmedical fields as well³⁹. Such variation over time

may be due to the development of coping mechanisms or, possibly, attrition from the field. Additional work following a cohort of trainees into their careers may help to clarify these issues.

Overall, the faculty in the current study showed more than twice the rate of psychological symptomatology in comparison with that found in our pilot study²². The prevalence of depression as reported by our faculty (18.6%) exceeded the 12.8% lifetime prevalence of depression reported among male physicians⁴⁰. This finding deserves additional investigation, particularly given that the suicide rate among physicians is nearly twice that of all other employed persons⁴¹.

In our pilot study, one-third of the residents showed significant psychiatric symptomatology, which is consistent with studies of other resident groups^{6,22}. In the current study, only one-sixth of the residents showed similar levels of distress. These findings mirror the improvement noted by Zaré et al. in their evaluation of the well-being of surgery residents before and after the implementation of the work-hour restrictions⁴².

The average number of work hours reported by the resident group in the present study (70.24 hours per week) suggested compliance with the eighty-hour ACGME work-hour-restriction guidelines. Despite limited work hours, sleep deprivation was extremely prevalent among the resident group. In contrast, Hutter et al. noted increased resident sleep time following implementation of work-hour restrictions in their study of surgical residents at Massachusetts General Hospital³⁵. We are not able to account for the continued lack of sleep among our responding residents following the implementation of work-hour restrictions, but it is possible they are spending more time reading or participating in recreational pursuits. Negative impacts of sleep deprivation on mood have been described previously in studies of residents as well as among practicing transplant surgeons^{10,20,43}. Indeed, in our resident group, sleep deprivation correlated with increased burnout, higher levels of psychological distress, and decreased marital satisfaction.

On a positive note, reported job satisfaction was fairly high in both the resident and faculty groups. Moore, in a survey of 200 academic surgeons, found that 92% of the respondents were extremely or moderately satisfied with their work, which was slightly higher than the rate of faculty satisfaction in the present study; however, the survey by Moore predated the ACGME resident-work-hour restrictions²⁹. Hutter et al. noted that the quality of life of attending surgeons at Massachusetts General Hospital decreased following the implementation of the work-hour-restriction policy³⁵.

The job satisfaction reported by our respondents is difficult to reconcile with the concerning levels of burnout and psychological distress that our survey detected. Indeed, our faculty satisfaction results sharply contrast with those reported by Saleh et al.³⁸. Their survey of 282 past, acting, and current orthopaedic chairmen and program directors demonstrated that only 20% of respondents were satisfied with their current position whereas 26% reported frank dissatisfaction³⁸. As noted previously, the group in the study by Saleh et al. had

similar levels of depersonalization but markedly higher levels of emotional exhaustion than our faculty did³⁸. It may be that emotional exhaustion is more detrimental to perceived job satisfaction than depersonalization is.

As in our pilot study, both the resident and faculty groups appeared to have nondistressed relationships on the Revised Dyadic Adjustment Scale. Being in a committed, harmonious relationship correlated with reduced levels of burnout for both groups. Our findings are consistent with the finding reported by Gabbe et al.¹¹ in a study of obstetrics and gynecology chairmen that having a supportive spouse was associated with lower burnout, and they support the contention of Sotile and Sotile⁴⁴ that positive marital functioning is a powerful protector of physician resilience.

Despite the finding that the majority of the marriages and relationships of residents were functioning well, the residents reported less satisfaction with work/life balance and more work interference with home than faculty did. Interestingly, faculty reported more stress due to work/life conflicts. In the study by Gabbe et al., dissatisfaction with work/life balance was shown to be associated with a decreased sense of efficacy among obstetrics and gynecology chairmen¹¹. Warde et al. found that minimizing role conflict increased marital and parental satisfaction for married physicians with children⁴⁵. In the study by Moore, balancing work and home demands constituted the greatest source of work stress among surgeons²⁹.

Overall, faculty reported higher stress levels than residents did. This finding may be due to the increased burdens of responsibility or to generational differences. However, it should be noted that the coping benefits of having supportive relationships has been well documented⁴⁶, and residents in the present study perceived significantly greater levels of support from medical colleagues, colleagues' families, and their residency program than faculty did. Social support has been shown to correlate positively with psychological and physical health even in the presence of stressors⁴⁷.

Residents reported offsetting stress by turning to their mates and to their colleagues for support. These results are encouraging given the observations of Krizek regarding the frequent lack of adequate support systems among surgical trainees⁴⁸. The support system of the average individual in the general population consists of seventeen persons⁴⁸. Krizek noted that at the outset of surgical training, the average resident's support system consists of "only 1 [being], and in 25% of residents that support is nonhuman, such as a cat, dog, or goldfish." Krizek reported that, among senior residents, the number increases to four or five people and remains at that level for surgeons pursuing academic careers.

In comparison with our resident group, faculty perceived less support from their peers and department. Similarly, in the study by Saleh et al., only 13% of orthopaedic chairmen and program directors reported the availability of a peer support group within their institution³⁸. These findings are concerning because perceptions of poor institutional support and poor colleague relationships are correlated with increased turnover among internal medicine program directors, as noted by Beasley

et al.⁴⁹. In addition, our faculty felt that they received less support from their spouses and families. Low spousal and family support were shown to correlate with increased burnout among otolaryngology chairmen in the study by Johns and Ossoff³ as well as among nonsurgical physicians in the study by Linzer et al.¹⁴.

To our knowledge, ours is the first study to assess variations in psychosocial functioning between large and small residency training programs. Overall, residents in larger programs had greater degrees of burnout and faculty in larger programs were lonelier and came home more irritable. Our instrument does not provide sufficient detail to assess whether these variations reflect a selection bias within the programs or characteristics of the individual institutions; it is possible that the smaller programs are selecting residents who are more attuned to the personality of their programs. It is also possible that location contributes to the discrepancies. Many of the larger programs are high-volume centers located in urban settings. Higher stress levels have been noted among secondary school teachers working in urban settings as compared with their colleagues working in rural schools^{50,51}. It is possible that urban settings generate more stress for physicians as well. Future work assessing the impact of an urban setting as compared with a nonurban setting, the number of hospitals covered by a given program, and other program factors may help to explain why, despite having a larger orthopaedic service, the faculty are lonelier and the residents are more stressed.

In comparison with our pilot study that was performed before the implementation of the work-hour restrictions, the present study of United States orthopaedic residents reflects improvement in terms of both burnout and psychological distress for residents but increased burnout for faculty. Orthopaedic residents remained at moderately high risk for burnout and were at significantly greater risk as compared with their faculty. Characteristics delineated in Table III may be helpful for identifying residents who are at increased risk for decompensation in order to enable early intervention. Second-year residents are particularly vulnerable, probably reflecting the longer hours that they work and the steep learning curve accompanying the transition into orthopaedic training. A multicenter longitudinal study would help to clarify the fluctuations over the course of training.

While the present study did not reveal widespread indications of faculty distress, several of our findings are worthy of future research assessing faculty well-being. As noted in a number of other surgical fields, younger faculty who are at an early stage of their academic careers are especially susceptible to burnout and psychological distress. Furthermore, it appears that faculty in general feel that they are "going it alone," without great support of their families or from their departments. It is possible that increased faculty work demands that correspond with limitations in resident work hours may contribute to gradual wear-down for faculty and increased stress, psychological distress, and isolation from their colleagues.

Finally, for the individual resident or faculty member who is seeking to avoid or cope with stress and burnout, attention to the protective factors noted in Tables IV and V may

prove helpful. While not every factor is entirely within the individual's control, we can each strive to make time for exercise, hobbies, and our significant others. We can limit our alcohol use, speak with our mentors, and draw on the support of our colleagues and their families.

Appendix

eA The survey instruments used in the present study are available with the electronic versions of this article, on our web site at jbjs.org (go to the article citation and click on "Supplementary Material") and on our quarterly CD/DVD (call our subscription department, at 781-449-9780, to order the CD or DVD). ■

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