

Clinical Research

What Is the Prevalence of Burnout, Depression, and Substance Use Among Orthopaedic Surgery Residents and What Are the Risk Factors? A Collaborative Orthopaedic Educational Research Group Survey Study

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Received: 24 January 2020 / Accepted: 23 April 2020 / Published online: 22 May 2020
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Abstract

Background Burnout and depression among healthcare professionals and trainees remain alarmingly common. In 2009, 56% of orthopaedic surgery residents reported burnout. Alcohol and illicit drug use are potential

exacerbating factors of burnout and depression; however, these have been scarcely studied in residency populations. **Questions/purposes** (1) What proportion of orthopaedic residents report symptoms of burnout and depression? (2)

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Each author certifies that his or her institution waived approval for the human protocol for this investigation and that all investigations were conducted in conformity with ethical principles of research.

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All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research*® editors and board members are on file with the publication and can be viewed on request.

What factors are independently associated with an orthopaedic resident reporting emotional exhaustion, depersonalization, low personal accomplishment, and depression? (3) What proportion of orthopaedic residents report hazardous alcohol or drug use? (4) What factors are independently associated with an orthopaedic resident reporting hazardous alcohol or drug use?

Methods We asked 164 orthopaedic surgery programs to have their residents participate in a 34-question internet-based, anonymous survey, 28% of which (46 of 164) agreed. The survey was distributed to all 1147 residents from these programs, and 58% (661 of 1147) of these completed the survey. The respondents were evenly distributed among training years. Eighty-three percent (551 of 661) were men, 15% (101 of 661) were women, and 1% (nine of 661) preferred not to provide their gender. The survey asked about demographics, educational debt, sleep and work habits, perceived peer or program support, and substance use, and validated instruments were used to assess burnout (abbreviated Maslach Burnout Inventory), depression (Patient Health Questionnaire-2), and hazardous alcohol use (Alcohol Use Disorder Identification Test—Consumption). The main outcome measures included overall burnout, emotional exhaustion, depersonalization, low personal accomplishment, depression, and hazardous alcohol and drug use. Using the variables gathered in the survey, we performed an exploratory analysis to identify significant associations for each of the outcomes, followed by a multivariable analysis.

Results Burnout was reported by 52% (342 of 661) of residents. Thirteen percent of residents (83 of 656) had positive screening results for depression. Factors independently associated with high emotional exhaustion scores included early training year (odds ratio 1.15; 95% confidence interval, 1.01-1.32; $p = 0.03$) unmanageable work volume (OR 3.13; 95% CI, 1.45-6.67; $p < 0.01$), inability to attend health maintenance appointments (OR 3.23; 95% CI, 1.69-6.25; $p < 0.01$), lack of exercise (OR 1.69; 95% CI, 1.08-2.70; $p = 0.02$), and lack of program support (OR 3.33; 95% CI, 2.00-5.56; $p < 0.01$). Factors independently associated with depersonalization included early training year (OR 1.27; 95% CI, 1.12-1.41; $p < 0.01$), inability to attend health maintenance appointments (OR 2.70; 95% CI, 1.67-4.35; $p < 0.01$), and lack of co-resident support (OR 2.52; 95% CI, 1.52-4.18; $p < 0.01$). Low personal accomplishment was associated with a lack of co-resident support (OR 2.85; 95% CI, 1.54-5.28; $p < 0.01$) and lack of program support (OR 2.33; 95% CI, 1.32-4.00; $p < 0.01$). Factors associated with depression included exceeding duty hour restrictions (OR 2.50; 95% CI, 1.43-4.35; $p < 0.01$) and lack of program support (OR 3.85; 95% CI, 2.08-7.14; $p < 0.01$). Sixty-one percent of residents (403 of 656) met the criteria for hazardous alcohol use. Seven percent of residents (48 of 656) reported using

recreational drugs in the previous year. Factors independently associated with hazardous alcohol use included being a man (OR 100; 95% CI, 35-289; $p < 0.01$), being Asian (OR 0.31; 95% CI, 0.17-0.56; $p < 0.01$), single or divorced marital status (OR 2.33; 95% CI, 1.47-3.68; $p < 0.01$), and more sleep per night (OR 1.92; 95% CI, 1.21-3.06; $p < 0.01$). Finally, single or divorced marital status was associated with drug use in the past year (OR 2.30; 95% CI, 1.26-4.18; $p < 0.01$).

Conclusions The lack of wellness among orthopaedic surgery residents is troubling, especially because most of the associated risk factors are potentially modifiable. Programs should capitalize on the modifiable elements to combat burnout and improve overall wellbeing. Programs should also educate residents on burnout, focus on work volume, protect access to health maintenance, nurture those in the early years of training, and remain acutely aware of the risk of substance abuse. Orthopaedic surgery trainees should strive to encourage peer support, cultivate personal responsibility, and advocate for themselves or peers when faced with challenges. At a minimum, programs and educational leaders should foster an environment in which admitting symptoms of burnout is not seen as a weakness or failure.

Level of Evidence Level II, prognostic study.

Introduction

Background

Burnout is defined as “a syndrome resulting from chronic workplace stress that has not been successfully managed. It is characterized by three dimensions: feelings of energy depletion or exhaustion; increased mental distance from one’s job, or feelings of negativism or cynicism related to one’s job; and reduced professional efficacy” [44]. Burnout is more common in physicians than in nearly all other professions in the United States, and it is steadily increasing, with more than 50% of physicians reporting at least one symptom of burnout [35, 38]. Burnout may contribute to detriments not only to personal health, but also to patient care and safety and overall healthcare costs [34, 37, 43]. A 2009 survey of orthopaedic residents and faculty further delineated the high proportions of burnout among trainees, with 56% of residents and 28% of faculty reporting burnout [33]. More recently, the American Orthopaedic Association published a review highlighting the widespread incidence of burnout and compromised wellbeing, as well as ways to improve these conditions in the future [2].

The prevalence of depression in the general United States population is 8.4% [24] but is higher in physicians [27, 32, 33, 36]. A 2009 survey of American surgeons revealed that 30% of physicians experienced depressive symptoms [36]. Rates of burnout, depression, and work-life balance satisfaction are similar between physicians and

members of the general United States population before medical training, but sharply increase throughout residency [36].

Alcohol and drug use have been scarcely studied in residency training programs. Substance use, especially alcohol use, deserves attention as high-risk alcohol consumption increases in the United States [14]. Orthopaedic surgeons are at a high risk of having alcohol abuse or dependency [26]. Furthermore, there seems to be a strong association between substance use disorders and psychiatric illness [20].

Rationale

The argument that burnout is inevitable and transient during an inherently demanding training period does not consider the larger impact of burnout. A single-point increase in depersonalization or emotional exhaustion scores has been linked to an increase in medical errors by 5% to 11% [35]. Furthermore, a prospective study identified that the symptoms of burnout and stress during residency may persist 10 years into professional practice [28]. Recently, the Accreditation Council for Graduate Medical Education has implemented programs to foster wellbeing among trainees and provide resident physicians with strategies to deal with distress [6, 7, 16, 23]. The current Common Program Requirements of the Accreditation Council for Graduate Medical Education includes new mandates for programs to focus on wellbeing [1]. However, because the last large investigation of orthopaedic surgery resident burnout was published a decade ago [33] and because there have been relatively little data on resident substance use, it is imperative that these outcomes are assessed to determine the effectiveness of interventions recommended by the Accreditation Council for Graduate Medical Education and made by programs and individuals.

Study Questions

We therefore asked: (1) What proportion of orthopaedic residents report symptoms of burnout and depression? (2) What factors are independently associated with an orthopaedic resident reporting emotional exhaustion, depersonalization, low personal accomplishment, and depression? (3) What proportion of orthopaedic residents report hazardous alcohol or drug use? (4) What factors are independently associated with an orthopaedic resident reporting hazardous alcohol or drug use?

Materials and Methods

Study Design and Settings

After institutional review board approval was obtained for this study, all 164 orthopaedic surgery programs in the

United States were contacted and invited to participate. Twenty-eight percent (46 of 164) of these orthopaedic surgery residency programs (1147 potential resident respondents) agreed to participate in a voluntary, 34-question internet-based, anonymous survey on resident burnout and wellbeing. Fifty-eight percent (661 of 1147) of the residents in these 46 programs completed the survey.

Twenty-three percent of the respondents (149 of 661) were postgraduate year (PGY) 1 residents, 19% (125 of 661) were PGY2 residents, 19% (126 of 661) were PGY3 residents, 19% (125 of 661) were PGY4 residents, 20% (131 of 661) were PGY5 residents, and 1% (five of 661) did not specify their training year. Twenty-two percent (143 of 661) reported training in the Northeast United States, 36% (240) trained in the Southeast, 25% (163) trained in the Central region, 13% (85) trained in the Southwest, 3% (23) trained in the Northwest, and 1% (seven respondents) had an unknown location. Seventy-six percent (505 of 661) of the respondents were training in a university hospital, 13% (85) were in a community hospital, 4% (28) were in private hospitals, 6% (38) were in a military hospital, and the hospital type was unknown for 1% (five respondents). Eighty-three percent of the respondents (551 of 661) identified as men, 15% (101) identified as women, and 1% (nine respondents) preferred not to provide their gender.

Survey Process

Each of the 46 programs received a standardized presentation with a study overview including purpose, design, and letter of informed consent (see Supplemental Digital Table 1; <http://links.lww.com/CORR/A345>). The program director gave the information to the residents, and we invited them to anonymously complete an internet-based survey (Qualtrics, Seattle, WA, USA). Responses were maintained in a secure cloud-based database accessible only by the lead author (PML).

The survey included questions about potential variables related to wellbeing as well as validated instruments for assessing burnout (abbreviated Maslach Burnout Inventory), alcohol consumption (Alcohol Use Disorder Identification Test—Consumption), illicit drug use (Single Question), and depression (Patient Health Questionnaire-2).

Demographic Variables

The survey included questions about residency training year, geographic region, gender, ethnicity, age, marital status, children, education debt, and type of training hospital. Each of these variables were analyzed in relation to burnout domains (see Supplemental Digital Table 2; <http://links.lww.com/CORR/A346>) as well as depression,

alcohol misuse, and drug use (see Supplemental Digital Table 3; <http://links.lww.com/CORR/A347>).

Lifestyle Habits and Perceived Support

Survey responders were asked to answer “agree,” “disagree,” or “neither” to a series of statements: “I feel that surgical and clinical volume at my residency program is manageable,” “On average, I do not exceed monthly duty hour restrictions,” “On average, I am able to get enough exercise per week,” “I am able to routinely attend health maintenance appointments (primary care provider, dentist, optometrist, or therapist),” “My residency program provides adequate education and resources for wellbeing and burnout,” “I feel supported by my residency program in dealing with burnout, wellbeing, and substance abuse,” and “I feel supported by my co-residents in dealing with burnout, wellbeing, and substance abuse.” Finally, residents were asked how many hours of sleep per night they get and whether they have sought professional assistance for work-related stress during their training. Each of these answers were analyzed in relation to burnout domains (see Supplemental Digital Table 4; <http://links.lww.com/CORR/A348>) as well as depression, alcohol misuse, and drug use (see Supplemental Digital Table 5; <http://links.lww.com/CORR/A349>).

Abbreviated Maslach Burnout Inventory

The abbreviated Maslach Burnout Inventory is a commonly used assessment of burnout with three domains: emotional exhaustion, depersonalization, and personal accomplishment [31, 32, 36]. Higher scores for emotional exhaustion and depersonalization and lower scores for personal accomplishment correlate with greater burnout. Similar to other studies investigating resident burnout, including Sargent et al.’s [33] study of orthopaedic surgery residents, overall burnout was characterized by scores in the high tercile of either emotional exhaustion or depersonalization [30, 33, 39, 41].

Screening Alcohol and Illicit Drug Use

Alcohol use was assessed by the Alcohol Use Disorder Identification Test—Consumption [25]. Scores range from 0 to 12, with higher scores indicating greater alcohol consumption. Hazardous alcohol use is defined by a score of at least 4 for men and 3 for women. Alcohol abuse is defined by a score of at least 5 for men and 4 for women [13, 25]. The frequency of recreational drug use, including

marijuana or prescription medication, was assessed with a single-question screening test.

Patient Health Questionnaire-2

The Patient Health Questionnaire-2 is a depression screening tool. The questions assess the frequency of depressed mood and anhedonia symptoms [3]. Each item is scored on a scale from 0 (not at all) to 3 (nearly every day), with scores of 3 or higher indicating depression [18]. Additional questions were used to assess demographics, perception of work volume, duty hour compliance, exercise, ability to attend health appointments, program-provided resources for wellbeing and burnout, and support from programs and co-residents in addressing wellness.

Primary and Secondary Study Outcomes

Our primary study outcomes were the proportion of residents with high (≥ 11) emotional exhaustion scores on the abbreviated Maslach Burnout Inventory, high (≥ 7) depersonalization scores on the abbreviated Maslach Burnout Inventory, low (≤ 12) personal accomplishment scores on the abbreviated Maslach Burnout Inventory, positive depression screening (Patient Health Questionnaire-2 score ≥ 3), hazardous alcohol use (Alcohol Use Disorder Identification Test—Consumption score ≥ 4 for men and ≥ 3 for women), and drug use in the past year (answered “yes” to use of illicit drugs within the past year). Finally, the criterion for overall burnout for each resident was scoring ≥ 11 in emotional exhaustion or ≥ 7 in depersonalization on the abbreviated Maslach Burnout Inventory.

Our secondary study outcomes were determining what factors were independently associated with each primary outcome (emotional exhaustion, depersonalization, low personal accomplishment, depression, hazardous alcohol use, and drug use). To ascertain independent associations, we performed an exploratory univariable analysis followed by a more-definitive multivariable analysis, as described below. The exploratory univariable analysis also evaluated hazardous drinking, drug use, and depression as potential independent variables for burnout domains (see Supplemental Digital Table 6; <http://links.lww.com/CORR/A350>).

Statistical Analysis

The association of burnout domains, depression, and substance abuse with resident characteristics was evaluated using chi-square tests. Fisher’s exact test was used

Table 1. Odds ratios for risk factors affecting burnout domains

Factor			Emotional exhaustion			Depersonalization			Low personal accomplishment		
	Study response	Reference response	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value
Training year			1.15	1.01-1.32	0.03	1.27	1.12-1.41	< 0.01		a	
"My work volume is manageable"	"Disagree"	"Agree"	3.13	1.45-6.67	< 0.01		a			a	
	"Neither"	"Agree"	1.49	0.52-4.35	0.46						
"I am able to attend health maintenance appointments"	"Disagree"	"Agree"	3.23	1.69-6.25	< 0.01	2.70	1.67-4.35	< 0.01		a	
	"Neither"	"Agree"	1.43	0.76-2.70	0.26	1.04	0.63-1.72	0.87			
"I get enough exercise per week"	"Disagree"	"Agree"	1.69	1.08-2.70	0.02		a			a	
	"Neither"	"Agree"	2.50	1.15-5.56	0.02						
"I feel supported by co-residents"	"Disagree"	"Agree"	1.33	0.71-2.50	0.37	2.52	1.52-4.18	< 0.01	2.85	1.54-5.28	< 0.01
	"Neither"	"Agree"	2.25	1.30-3.88	< 0.01	1.42	0.91-2.22	0.12	2.02	1.15-3.56	0.01
"I feel supported by my program"	"Disagree"	"Agree"	3.33	2.00-5.56	< 0.01	1.52	0.82-2.78	0.18	2.33	1.32-4.00	< 0.01
	"Neither"	"Agree"	2.17	1.33-3.57	< 0.01	1.89	1.34-3.23	0.02	1.47	0.86-2.56	0.16

^aThese variables were eliminated in the stepwise logistic regression because they were nonsignificant in the multivariable analysis.

when necessary. For each dependent variable, a stepwise logistic regression analysis was used to identify variables demonstrating statistically significant, independent associations. The reported results represent only the variables that were statistically significant after a multivariable analysis. *p* values of less than 0.05 were considered significant.

Odds ratios were used to assess the strength of association for each significant factor on burnout domains (Table 1), depression, hazardous alcohol use, and drug use (Table 2). For questions pertaining to variables that required residents to respond, "agree," "disagree," or "neither," two ORs were reported (for "disagree" versus "agree" and "neither" versus "agree"). All data analyses were conducted using SAS version 9.4 (Copyright © 2013, SAS Institute Inc., Cary, NC, USA).

Results

Prevalence of Burnout and Depression

Fifty-two percent of respondents (342 of 661) scored above the threshold for overall burnout (scoring ≥ 11 in emotional exhaustion or ≥ 7 in depersonalization on the abbreviated Maslach Burnout Inventory). Within the individual burnout domains, 35% (228 of 656) of residents scored in the "high" range for emotional exhaustion, 46% (299 of 656) scored in the high range for depersonalization, and 20% (134 of 656) scored in the low range for personal accomplishment. Thirteen percent of residents (83 of 661) reported depression (≥ 3 on the Patient Health Questionnaire-2). Only 51% of residents (335 of 656) felt their program provided adequate resources to deal with

burnout and wellbeing, and 55% (361 of 656) felt supported by their program. Seventy-three percent of residents (481 of 656), felt supported by their co-residents. Nine percent (56 of 655) sought professional assistance for work-related stress.

Factors Associated with Emotional Exhaustion

Early training year was associated with high scores for emotional exhaustion (OR 1.15; 95% confidence interval, 1.01-1.32; *p* = 0.03), with 40% (59 of 149) of PGY 1 residents and 47% (59 of 125) of PGY2 residents scoring high in the emotional exhaustion domain (Fig. 1). Residents who felt their surgical and clinical volume was unmanageable (OR 3.13; 95% CI, 1.45-6.67; *p* < 0.01), failed to exercise "enough per week" (OR 1.69; 95% CI, 1.08-2.70; *p* = 0.01), were unable to routinely attend health appointments (OR 3.23; 95% CI, 1.69-6.25; *p* < 0.01), and felt unsupported by their program (OR 3.33; 95% CI, 2.00-5.56; *p* < 0.01) were more likely to experience high emotional exhaustion than those without these characteristics.

Factors Associated with Depersonalization

Early training year was also associated with high scores for depersonalization (OR 1.27; 95% CI, 1.12-1.41; *p* < 0.01), with 56% (83 of 149) of PGY1 residents and 51% (64 of 125) of PGY2 residents reporting high depersonalization (Fig 1). Those reporting the inability to attend routine health appointments (OR 2.70; 95% CI, 1.67-4.35; *p* < 0.01) and a lack of support from co-residents (OR 2.52; 95% CI,

Table 2. Risk factors for depression and hazardous alcohol and drug use

Factor	Study response	Reference response	Depression (PHQ-2)			Hazardous alcohol use (AUDIT-C)			Drug use in the past year (yes or no)		
			OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value
Gender	Men	Women		a		100	35-289	< 0.01		a	
Race	Asian	White		a		0.31	0.17-0.56	< 0.01		a	
	Black	White				0.86	0.28-2.65	0.79			
	Other	White				0.62	0.33-1.16	0.14			
Marital status	Single or Divorced	Married		a		2.33	1.47-3.68	< 0.01	2.30	1.26-4.18	< 0.01
"I do not regularly exceed duty hour restrictions"	"Disagree"	"Agree"	2.50	1.43-4.35	< 0.01		a			a	
	"Neither"	"Agree"	1.15	0.53-2.50	0.72						
Average hours of sleep per night	7 hours	6 hours		a		1.92	1.21-3.06	< 0.01		a	
	8 hours or more	6 hours				1.43	0.83-2.49	0.20			
"I feel supported by my program"	"Disagree"	"Agree"	3.85	2.08-7.14	< 0.01		a			a	
	"Neither"	"Agree"	2.56	1.39-4.76	< 0.01						

^aThese variables were eliminated in the stepwise logistic regression because they were nonsignificant in the multivariable analysis. PHQ-2 = Patient Health Questionnaire-2; AUDIT-C = Alcohol Use Disorders Identification Test-Concise.

1.52-4.18; $p < 0.01$) were more likely to report high depersonalization scores than those without these characteristics.

Factors Associated with Low Personal Accomplishment

Lack of program support (OR 2.33; 95% CI, 1.32-4.00; $p = 0.01$) and lack of co-resident support (OR 2.85; 95% CI, 1.54-5.28; $p < 0.01$) were associated with low personal accomplishment scores (Table 1).

Factors Associated with Depression

Positive depression screening results were associated with exceeding duty hour restrictions (OR 2.5; 95% CI, 1.43-4.35; $p < 0.01$) and lack of program support (OR 3.85; 95% CI, 2.08-7.14; $p < 0.01$).

Prevalence of Hazardous Alcohol and Drug Use

Sixty-one percent of responding residents (403 of 661) met the criteria for hazardous alcohol use (Alcohol Use Disorder Identification Test—Consumption score ≥ 4 for men and ≥ 3 for women). Seven percent (48 of 661) of the residents reported using illegal or recreational drugs in the previous year.

Factors Associated with Hazardous Alcohol and Drug Use

Being a man (OR 100; 95% CI, 35-289; $p < 0.01$), single or divorced marital status (OR 2.33; 95% CI, 1.47-3.68), and sleeping an average of 7 hours per night (versus 6 hours) (OR 1.92; 95% CI, 1.21-3.06; $p < 0.01$) were associated with hazardous drinking. Asian ethnicity was associated with a lower proportion of hazardous alcohol use than white race was (OR 0.31; 95% CI, 0.17-0.56; $p < 0.01$). Single or divorced marital status (OR 2.30; 95% CI, 1.26-4.18; $p < 0.01$) was associated with illegal or recreational drug use in the past year (Table 2).

Discussion

Burnout, depression, and substance abuse are critical issues in residency training. Beyond the affected resident, these issues may have a profound impact on patient care, safety, and healthcare cost [34, 37, 43]. Alarming, more than half of orthopaedic residents are plagued by burnout, despite a decade of efforts that appear to have missed the mark. In addition, the prevalence of alcohol abuse, illicit drug use, and depression is worrisome. The attempts to reduce burnout and improve wellbeing among orthopaedic residents appear to have been largely ineffective. A focus

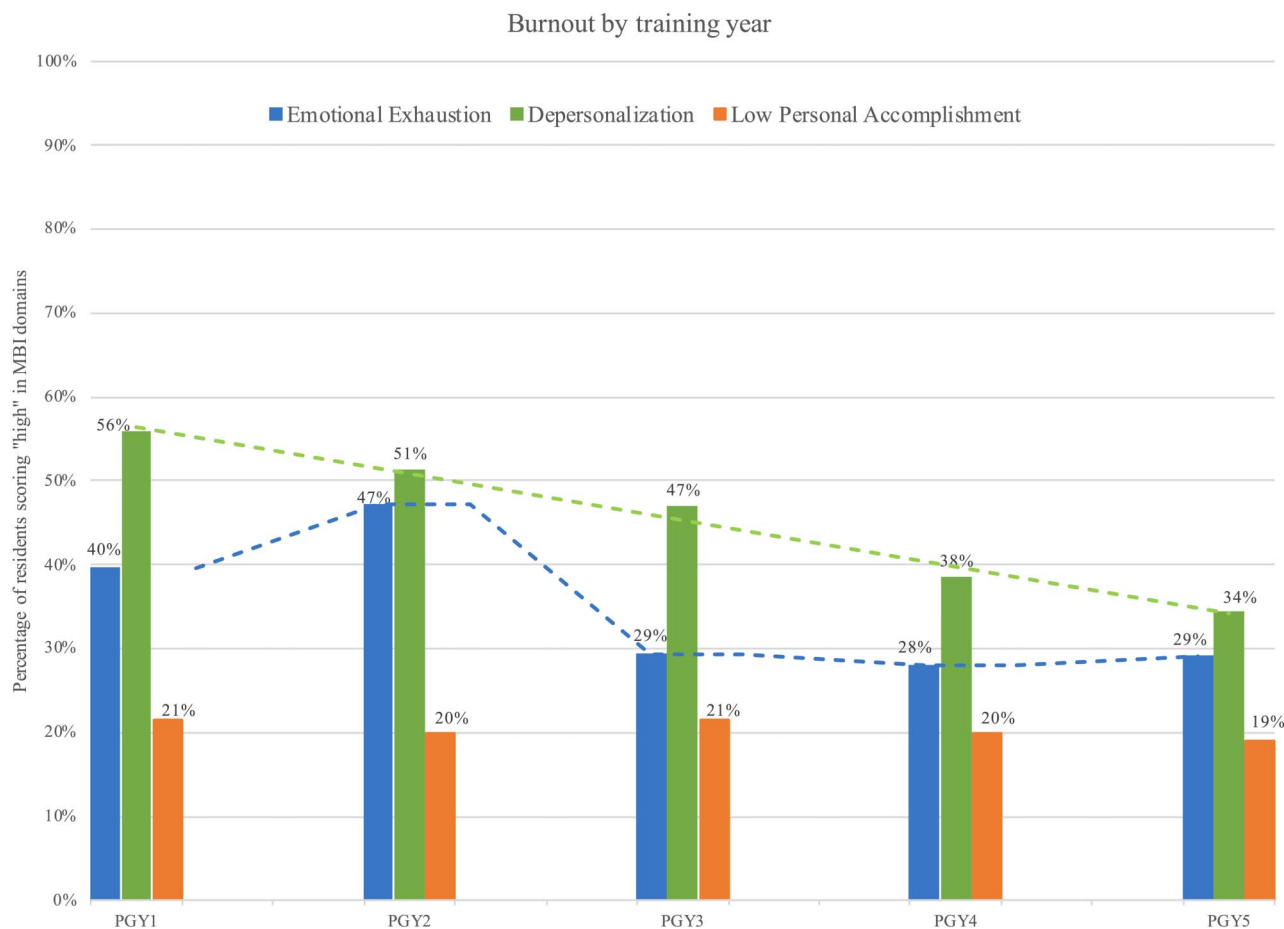


Fig. 1 This graph shows burnout by training year. The percentages of residents scoring “high” on MBI domains was the highest among PGY1 and PGY2 residents. MBI = abbreviated Maslach Burnout Inventory; PGY = postgraduate year.

on potentially modifiable factors may be the key to realizing improvements.

Limitations

Our study is limited by potential responder bias. Responders may differ from non-responders, although this is mitigated by the 58% of invited residents who completed the survey. The prevalence of burnout would range from 30% if all of the nonresponding residents did not experience burnout to 73% if all nonresponding residents experienced burnout. We also believe the responding population is a valid representation of the entire orthopaedic surgery resident population, because the ethnicity (see Supplemental Digital Table 7; <http://links.lww.com/CORR/A351>) and gender (see Supplemental Digital Table 8; <http://links.lww.com/CORR/A352>) of the responding residents mirrors the demographic data of the entire orthopaedic surgery population [5, 8]. Lastly, no interventions were performed. Future studies of resident

burnout might investigate the effects of interventions such as wellness education programs, changes in resident work schedules, or alcohol misuse education and treatment.

Proportion of Residents with Symptoms of Burnout or Depression

We were disappointed to find that resident burnout and depression persisted between 2009 and 2019 [33]. This was unexpected because burnout among internal medicine residents dropped by 15% between 2001 to 2012 [4, 19]. Screening for depression among orthopaedic residents remains more than twice as high as in the general United States population [24, 33]. Also concerning was that fewer than 10% reported seeking professional assistance in managing work-related stress or depression. We believe these findings regarding burnout, depression, and professional assistance reflect both an overarching stigma and a lack of support by training programs because more than 50% of physicians report hesitance to seek mental

health care, fearing medical licensure limitations [9]. A culture that deters self-care is dangerous and must be addressed by leadership because burnout symptoms may be interpreted as laziness or lack of interest. Recent orthopaedic research has suggested lack of ownership by residents, a possible generational stereotype, as a hindrance to education, rather than acknowledging a need to consider or address burnout and wellbeing [21].

Factors Associated with Burnout or Depression

Time limitations and work requirements were common themes, including early training year, unmanageable work volume, the inability to attend health maintenance appointments, lack of exercise, and lack of program and co-resident support. Exceeding duty hour restrictions and lack of program support were associated with depression. Across multiple surgical specialties, weekly duty hours remain a good predictor of burnout [27]. Although our findings agree with previous studies demonstrating excessive work is associated with increased burnout and depression [4, 11], we did not find associations with educational debt, sleep, or alcohol consumption [26, 33, 42]. One study reported higher burnout among women physicians than among men [40]; however, our results show a similar prevalence of burnout between genders. Given the small number of women in the cohort and in the overall orthopaedic resident population (15%), the lack of power may have contributed to our findings. The high prevalence of burnout among PGY1 and PGY2 residents is similar to that of other specialties and suggests adjusting to a residency has a large impact on burnout [10, 22]. One of the more alarming factors in this study, the lack of program support, was reported by almost half of residents. Although resident development will always be challenging, focusing wellness education or resources, particularly for junior residents, and seeking to reduce excessive or unnecessary work may provide the most realistic opportunity to reduce or prevent burnout and depression [29]. The modeling of specific wellness behaviors such as exercise or attending health appointments by orthopaedic faculty may be another important variable because 96% of orthopaedic residents feel mentors are critical to their success [12].

Proportion of Residents Reporting Hazardous Alcohol or Drug Use

Our findings regarding problematic alcohol consumption are overwhelmingly concerning; nearly two of three orthopaedic residents met the Alcohol Use Disorder Identification Test—Consumption criteria for alcohol misuse and 46% met the criteria for alcohol abuse. These

proportions are higher than those reported in general surgery residents (49% misuse; 33% abuse) and five times greater than in the general population (9.4% abuse) [22, 26]. Surprisingly, we did not find a strong correlation between burnout and substance abuse. Further investigation into this relationship is certainly warranted to guide potential interventions. We are uncertain about how to interpret the percentage of orthopaedic residents reporting the use of illegal or recreational drugs within the past year (7%) because recreational marijuana is legal in many of the states in this study.

Factors Associated Hazardous Alcohol or Drug Use

We found a strong association of gender (men), white race, and single or divorced status with hazardous drinking, consistent with findings from general-population studies [13, 15, 40]. However, this is in sharp contrast to the findings of studies of medical students and attending physicians [17, 25, 26]. Although these factors are mostly non-modifiable, they may identify those at a greater risk of developing alcohol use problems during residency.

Conclusions

We found that burnout, depression, and compromised wellbeing remain remarkably prevalent in orthopaedic surgery programs. This lack of wellness is especially troubling, given that most of the risk factors are potentially modifiable. Although the demands of surgical training will always be challenging, programs should capitalize on the modifiable elements to combat burnout and improve overall wellbeing. Programs should educate residents on burnout, focus on work volume, protect access to health maintenance, nurture those in the early years of training, and remain acutely aware of the risk of substance abuse. Likewise, orthopaedic surgery trainees should strive to encourage peer support, cultivate personal responsibility, and advocate for themselves or peers when faced with challenges. At a minimum, programs and educational leaders should foster an environment in which admitting symptoms of burnout is not seen as a weakness or failure.

Acknowledgments None.

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