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ORIGINAL RESEARCH

Burnout and Depression in the Orthopedic Resident: Prevalence and Protective Factors

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ABSTRACT

Introduction: Burnout is characterized by emotional exhaustion, a low sense of personal accomplishment, and high levels of depersonalization. While burnout is increasing across all medical specialties, no studies have focused on orthopedic residents. This study examines the prevalence of burnout and depression among orthopedic residents and seeks to identify protective factors.
Methods: A survey consisting of resident and program characteristics, the Patient Health Questionnaire-9 Depression form, and the Abbreviated Maslach Burnout Questionnaire was sent to 160 orthopedic residency program directors to distribute to their residents near the end of the 2018-2019 academic year. Regression analyses were then performed.
Results: Among 179 orthopedic residents who responded, 78% suffered from moderate or severe emotional exhaustion, 62% had moderate or severe levels of depersonalization, and 23% had a low sense of personal accomplishment. 59% showed at least moderate signs of depression, with prevalence increasing with post-graduate year. Residents who did not match in the top third of their rank list and those who decided on orthopedics later in medical school had higher risks of becoming depressed. A useful mentorship program, adherence to ACGME duty hour limits, and protected research/elective time were associated with less burnout.
Discussion: Burnout worsens throughout residency, and residency programs must teach the skills and behaviors necessary for an effective work-life balance. Institutional variables protective against burnout and depression must be implemented in order to maintain healthy residents.
Level of Evidence: II; Prospective survey study.
Keywords: Depression; Burnout; Orthopaedic residency training.

INTRODUCTION

Employee happiness and wellness has garnered an increasing amount of attention over the last decade throughout a variety of professional communities, medicine included. Burnout is characterized by emotional exhaustion, low sense of personal accomplishment, high levels of depersonalization, and too often leads to suicide. In medicine, these behavioral changes can not only be personally detrimental, but may also negatively impact patient care [1]. Physicians who report high levels of burnout are more likely to commit medical errors,

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flash out against others, and be less productive [2]. Recent studies show that physicians have a high rate of burnout relative to the general working population (37.9% versus 27.8%) [3]. Close to 50% of physicians reported at least one symptom of burnout. Additionally, investigations have shown that burnout starts prior to residency, with reported rates of 20% or higher in medical students [4]. This significant burnout penetrance within the field of medicine should be a cause for concern.

Burnout and decreased work satisfaction are associated with depression and suicidal ideation. The physician suicide rate has been reported to be between 28 and 40 per 100,000, more than twice the rate reported for the general population (12.3 per 100,000) [5]. Despite the incidence of physician burnout, depression, and suicide, research regarding the causative and protective variables has been sparse [6]. Much of the research has been observational in nature, focusing on the levels of burnout and depression within different medical specialties and tracking the increasing frequency among physicians [7]. There has been very little investigation into protection against burnout [3]. Given that burnout and depression are deeply intertwined, one can neither assess nor modify one without addressing the other [8].

Variables protective against burnout in urology residents were investigated. The authors noted both personal and institutional variables were valuable in fighting burnout. Two of these variables were the presence of structured mentorship programs and the availability of therapy [9]. Another study indicated that when given the opportunity, residents are likely to seek therapy, however this resource is often not available in training programs [10].

Orthopedic surgeons are a subgroup of physicians who experience burnout more frequently than other physicians, with rates ranging from 60-70% [5]. In addition, burnout is increasing in orthopedics faster than in other subspecialties [11]. It is not surprising that surgical specialties might have higher rates of burnout given the longer length of residencies. Orthopedic surgery residency in particular is associated with a high call burden and a long, steep learning curve [12]. Studies have shown that the levels of burnout increase as the necessity for call coverage increases [13]. Given these associations, it is reasonable to surmise that orthopedic residents would be at higher risk of burnout and depression than residents in other specialties; however, there is little research focused specifically on orthopedics.

This study aims to determine the prevalence of depression and burnout among orthopedic residents nationwide and to define potential protective mechanisms. It is hypothesized that there will be high prevalence of burnout and depression among all years of residency and that institutional characteristics will be associated with these levels of burnout and depression.

MATERIALS & METHODS

Survey Instrument

An email survey (available in *Appendix*) was sent to 160 orthopedic residency program directors to distribute among residents. Residents completed this survey anonymously through SurveyMonkey (SurveyMonkey Inc.; San Mateo, CA). Implied consent was obtained by completion of the survey. This survey was distributed near the end of the 2018-2019 academic year and closed prior to the start of the next academic year

and closed prior to the start of the next academic year in order to avoid inconsistency among respondents. Institutional IRB approval for the study was obtained prior to survey distribution.

The survey was composed of 35 questions covering basic demographics, vacation time and frequency of family visits, as well as residency program characteristics, including work and research support such as availability of a useful mentorship program, dedicated research time, and the emphasis placed on research. The full Patient Health Questionnaire 9 (PHQ-9) Depression and the Abbreviated Maslach Burnout Questionnaire were utilized [14,15]. The PHQ-9 categorizes respondents into five levels of depression, from none/minimal to severe. The Abbreviated Maslach is a validated assessment tool that determines scores for emotional exhaustion, depersonalization, and personal accomplishment. These were the three areas of burnout studied in this investigation. Both the PHQ-9 and the Abbreviated Maslach have been extensively validated in previous studies.

Regarding depression, the PHQ-9 answers were scored according to the standardized guidelines. This score corresponded to one of five depression severity categories: minimal, mild, moderate, moderately severe, and severe depression. For this study, the minimal and mild depression categories were combined, as were the remaining categories, in order to dichotomize the outcome variables and allow a determination of the presence or absence of depression.

Abbreviated Maslach scores for emotional exhaustion, depersonalization, and personal accomplishment determined burnout. The scores for each of these areas ranged from 0-18, with higher scores indicating greater emotional exhaustion, greater depersonalization, or greater sense of personal accomplishment (thought to be protective against burnout). As for depression, scores were dichotomized and grouped as present or absent. Residents with scores from 0-6 were considered to have none or minimal emotional exhaustion and depersonalization, whereas individuals with values from 7-18 were labeled as moderate or severe. For the personal accomplishment, the scoring was inverted and 0-12 was defined as present and 13-18 as absent.

Statistical Analysis

All statistical analyses were performed using SPSS (SPSS 21.0 for Windows, SPSS Inc, Chicago, IL). Chi-squared and Fishers exact test were performed, as appropriate, on all independent categorical variables with respect to the dependent variables of depression and burnout. Binary logistic regression models were created for each of the three burnout variables and for depression. A *P*-value of <0.05 was defined as significant. Odds ratios were used to determine the degree of increased or decreased risk of burnout or depression due to those variables.

RESULTS

A total of 179 orthopedic surgery residents responded to the survey. Nineteen percent were female, 70% were PGY-3 level or lower, and 81% came from programs respondents classified as academic. The majority lived greater than 100 miles from their hometown (76%) and had no close family in the training city (72%). Eighty-seven percent visited family more than twice per year, and 80% took at least 2 vacations yearly, which may have been combined with family visits. Seventy-nine percent said that their programs

Table 1. Summary of Responses Received from the Survey.

Question		Male (n=145)	Female (n=34)	Total (n=179)	%Within Group
PGY Level	PGY-1	37	11	48	27%
	PGY-2	32	7	39	22%
	PGY-3	34	4	38	21%
	PGY-4	17	6	23	13%
	PGY-5	25	4	29	16%
	PGY-6	0	1	1	1%
Which stereotype would you associate with your program?	Academic	113	32	145	81%
	Not Academic	31	2	33	19%
Where is your program located?	North	94	23	117	65%
	South	51	11	62	35%
How far from your hometown do you live?	<100 miles	40	3	43	24%
	≥100 miles	105	31	136	76%
Do you have close family in the same city as your residency?	No	99	30	129	72%
	Yes	46	4	50	28%
How often do you see close family?	<2 Year	20	4	24	13%
	≥2x Yearly	125	29	154	87%
How many vacations do you take per year?	1 or less	29	7	36	20%
	2 or more	116	27	143	80%
How much emphasis does your residency program place on research?	A lot	20	6	26	15%
	Somewhat	94	21	115	64%
	Not much at all	31	7	38	21%
Do you have either dedicated research or elective time during your residency?	No protected time	38	10	48	27%
	Protected time	107	23	130	73%
On average, would you state that you are able to adhere to the ACGME duty hour restrictions?	No	42	11	53	30%
	Yes	103	22	125	70%
How often are you on primary call?	Night float and Other	30	4	34	19%
	Q3	21	5	26	15%
	Q4	47	13	60	34%
	Q5	24	4	28	16%
	Q6+	23	7	30	17%
Does your residency have a useful mentorship program?	No useful mentorship	85	20	105	59%
	Active mentorship	60	13	73	41%
When did you decide on a career in orthopedics?	Before Medical School	53	9	62	35%
	During Medical School	92	25	117	65%
Approximately where on your rank list was your current program?	Top Third	117	28	145	81%
	Middle Third	19	5	24	13%
	Bottom Third	9	1	10	6%
Have you ever sought the help of a licensed therapist or psychiatrist?	No	116	18	134	75%
	I should	9	2	11	6%
	Yes, but no time/money	5	4	9	5%
	Yes, I went to therapy	15	9	24	14%

Table 1. ***continued.***

Question		Male (n=145)	Female (n=34)	Total (n=179)	%Within Group
Level of Depression	Not Depressed or Minimally Depressed	57	14	71	41%
	Depressed	86	16	102	59%
Level of Emotional Burnout	Not Burned Out	30	8	38	22%
	Moderate or Severe	110	22	132	78%
Level of Depersonalization Burnout	Not Burned Out	51	13	64	38%
	Moderate or Severe	89	17	106	62%
Level of Personal Accomplishment	High	104	26	130	77%
	Low	35	4	39	23%

placed an emphasis on research, and 73% had dedicated research or elective blocks. The largest percentage of respondents took primary call every fourth day (34%), and 30% of respondents said that they were not able to adhere to the ACGME duty hour maximums. More than half (59%) stated that their program did not create useful mentorship assignments or programs. Eighty-one percent said that they matched to a program that was in the top third on their rank list. A minority of respondents (35%) had chosen to specialize in orthopedics prior to medical school (Table 1).

Seventy-eight percent of respondents were categorized as suffering from moderate to severe emotional burnout. Logistic regression revealed that the presence of an active, useful mentorship program within a residency was associated with a 61% decrease in the risk of emotional burnout (0.39 OR, *P*=0.02) (Table 2).

Two variables approached statistical significance with regard to impacting emotional burnout: adherence to duty hours and the timing of an individual's decision to specialize in orthopedics. Residents in programs that adhered to the ACGME duty hour restrictions were 62% less likely to suffer emotional burnout than those that did not adhere to the restrictions (0.38 OR, *P*=0.068). Residents who decided on a career in orthopedics after starting medical school were twice as likely to experience emotional burnout during their training compared with those that entered medical school with the intention of specializing in orthopedic surgery (2.0 OR, *P*=0.07). While these values did not reach statistical significance, the magnitude of the effect suggests that they may be significant if a larger sample were obtained.

Sixty-two percent of residents suffered from moderate or severe depersonalization. Variables that increased the risk of depersonalization were choosing a career in orthopedics after starting medical school (2.1 OR, *P*=0.04) and visiting family more than twice yearly (2.9 OR, *P*=0.04). Variables protective against depersonalization included protected research or elective time (0.4 OR, *P*=0.03), having a useful mentorship program (0.5 OR, *P*=0.057), and taking two or more vacations yearly, regardless of whether these vacations included a family visit (0.5 OR, *P*=0.11).

High levels of personal accomplishment are known to be protective against

Table 2. Factors Affecting Various Components of Burnout

Emotional Burnout	**OR**	***P*-Value**
Increasing risk		
Orthopedics chosen during medical school	2.00	0.074
Protective		
Residency adherence to duty hours	0.38	0.068
Useful active mentorship	0.39	0.017
Depersonalization	**OR**	***P*-Value**
Increasing risk		
≥2 visits home	2.88	0.035
Orthopedics chosen during medical school	2.08	0.043
Protective		
≥ 2 Vacations	0.46	0.105
Protected research/elective time	0.39	0.028
Useful active mentorship	0.49	0.057
Low Sense of Personal Accomplishment	**OR**	***P*-Value**
Increasing risk		
Program was in bottom third of rank list	3	0.16
Program was in middle third of rank list	4.85	0.004
Protective		
≥ 2 visits home	0.2	0.003
Useful active mentorship	0.34	0.02
Depression	**OR**	***P*-Value**
Increasing risk		
PGY-2	2.1	0.13
PGY-3	1.1	0.88
PGY-4	5.4	0.01
PGY-5	3.1	0.04
Orthopedics chosen during medical school	2.84	0.004
Program was in bottom third of rank list	8.87	0.05
Program was in middle third of rank list	2.78	0.07
Protective		
Protected research/elective time	0.48	0.079
Residency adherence to duty hours	0.31	0.006

burnout. Twenty-three percent of respondents reported low levels of personal accomplishment, indicating high burnout. Variables associated with increased levels of personal accomplishment were the presence of a useful mentorship program (0.34 OR, P=0.02) and frequent visits home (0.2 OR, P<0.01). Residents who matched into programs listed in the middle third (4.85 OR, P<0.01) or the lower third (3.0 OR, P=0.16) of their rank list were more likely to report a low sense of personal accomplishment

compared to those matching in their upper third.

With regard to the PHQ-9 Depression questionnaire, 59% were classified as minimally depressed. Regression modeling showed that when compared to first year residents, the odds of depression increased with each subsequent PGY level. Furthermore, respondents that matched to a program in the lower third of their rank list experienced almost nine times the risk of depression compared to those who matched in the upper third (8.87 OR, P=0.05) (Table 2). Those matching in the middle of their rank list trended toward an increased risk of depression (2.84 OR, P=0.07). Residents who chose the field of orthopedics after starting medical school were at increased risk of depression compared with those who entered medical school with the intention of pursing orthopedics.

Adherence to duty hours was significantly correlated with less depression (0.3 OR, P<0.01), and protected research or elective time revealed a trend toward less depression (0.48 OR, P=0.08).

In both the depression and the burnout regression models, the resident's gender was not significantly associated.

DISCUSSION

Residency is a rigorous time in the development of a young physician. However, residents look toward the future with the expectation that everything will improve. Unfortunately, there exists data to the contrary. By way of example, in this study, a higher post-graduate year was associated with a greater prevalence of depression, with an odds ratio of 3.1 and 5.4 for the PGY-5 and PGY-4 residents, respectively. During training it is critical that residents not only develop effective clinical knowledge and ability but also internalize the behaviors and skills necessary to support a healthy work-life balance. Burnout and depression are intertwined. Physicians who report higher levels of burnout are more likely to commit clinical errors as well as suffer from depression, sometimes resulting in suicide [2,5]. In the present investigation involving exceedingly high achievers, 59% of orthopedic residents met the criteria for moderate or severe depression. Seventy-eight percent met the criteria for emotional burnout, with 62% showing high levels of depersonalization and 23% revealing a very low sense of personal accomplishment. These percentages are higher than those reported by Shanafelt et al [3], who examined the progression of burnout in physicians across all specialties between 2011 and 2014. Burnout rates for orthopedic surgeons in that study rose from 50% to 60% in just those 3 years. Our investigation reveals that burnout within the orthopedic resident physician community may be even higher, suggesting that interventions must be considered early in an orthopedic surgeon's education and career.

In the survey reported here, depression was less likely if the resident entered medical school with the intention of pursuing orthopedics or if they matched into a program in the top third of their rank list (Table 2). These individuals who entered medical school with a focused career path may have had more insight into what it means to be an orthopedic surgeon and therefore may have been more prepared and committed to their chosen field. One's career dedication and expectations may influence the development of depression. Additionally, residents who matched into

one of their first residency choices likely derived both a sense of fulfillment and success from this personal accomplishment. Better match results may also signify an earlier career decision and a more committed path. Institutionally, protected research time and adherence to duty hours was protective against depression.

Similar to the depression analysis, survey responses revealed two institutional variables that are potentially protective against orthopedic resident burnout. Across all three subcomponents of burnout, the presence of an active, useful mentorship program was associated with a decrease of 50-70% in the risk of burnout. These results are similar to those reported in a study of urology residents, which showed that mentorship programs were protective against burnout [9]. Adherence to ACGME duty hour restrictions and protected research time were also protective against multiple subareas of burnout.

Residents taking 2 or more vacations yearly, or those who reported 2 or more family visits yearly, were less likely to experience moderate to severe burnout compared with others. Protected research time was also associated with less burnout. However, vacation time and protected research time are not overlapping. In other words, using vacation for completion of research projects is not associated with diminished burnout. The implication is that vacations must be used for personal healing and well-being. Individual variables that increased the risk of burnout were the same as those associated with increased risk of developing depression. Residents who decided to pursue a career in orthopedics after starting medical school as well as those who did not match within the top third of their rank list were at higher risk for burnout in all three subareas. While these variables may not be easily modifiable, perhaps there may be value in changing the timing and approach by which medical students select specialties.

This study showed that call frequency and the proximity to one's hometown did not have a meaningful impact on burnout or depression. Despite on-call demands generally lessening with increasing seniority, depression was more frequent at higher PGY training levels. One quarter of residents had either had professional psychotherapy or expressed their desire to seek such help. However, of that 25%, 44% stated that lack of time or money prevented them from obtaining the service. While this study did not focus on defining or removing such barriers, an effective mentorship program might be a good first step and perhaps is one reason such programs have been found to be protective against burnout. Not only can an effective faculty mentor provide a level of de facto counseling, but they also can recognize and eliminate barriers to obtaining such needed medical services. Given that residents report high burnout levels even at the start of residency, though not specifically examined here, it seems likely that a resiliency training workshop might also help lessen the likelihood of burnout and depression [16].

The primary limitations of this study are those inherent in a survey-based investigation. While the questions were sent to all the orthopedic residency program directors, it is uncertain how many directors forwarded the survey to their residents and what the resident motivations were for survey completion. Given this, one cannot determine the precise study population and what differentiates responders from non-responders. However, this

investigation represents a large, national, and demographically diverse compilation of respondents. Furthermore, the results align with other similar studies reporting findings in other surgical specialties.

CONCLUSIONS

While orthopedic residency training is by nature rigorous, it should not be detrimental to the mental health and well-being of the learner. The education process must not force development of unhealthy work habits and behaviors that endanger our patients, our profession, and ourselves. This study demonstrated that more than half of orthopedic residents are moderately or severely depressed, and over three quarters exhibit symptoms of burnout. Establishing a useful mentorship program and protecting research time, among other simple institutional interventions, can be protective against burnout and depression. Developing competent and committed surgeons is not good enough: residencies must produce individuals focused on the health and well-being of not just their patients, but also themselves.

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