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GENERAL ORTHOPAEDICS

Physician wellness in orthopaedic surgery

A MULTINATIONAL SURVEY STUDY

H. Mir,
K. Downes,
A. F. Chen,
R. Grewal,
D. M. Kelly,
M. J. Lee,
P. Leucht,
S. K. Dulai

From Florida Orthopaedic Institute, Tampa, USA

Aims

Physician burnout and its consequences have been recognized as increasingly prevalent and important issues for both organizations and individuals involved in healthcare delivery. The purpose of this study was to describe and compare the patterns of self-reported wellness in orthopaedic surgeons and trainees from multiple nations with varying health systems.

Methods

A cross-sectional survey of 774 orthopaedic surgeons and trainees in five countries (Australia, Canada, New Zealand, UK, and USA) was conducted in 2019. Respondents were asked to complete the Mayo Clinic Well-Being Index and the Stanford Professional Fulfillment Index in addition to 31 personal/demographic questions and 27 employment-related questions via an anonymous online survey.

Results

A total of 684 participants from five countries (Australia (n = 74), Canada (n = 90), New Zealand (n = 69), UK (n = 105), and USA (n = 346)) completed both of the risk assessment questionnaires (Mayo and Stanford). Of these, 42.8% (n = 293) were trainees and 57.2% (n = 391) were attending surgeons. On the Mayo Clinic Well-Being Index, 58.6% of the overall sample reported feeling burned out (n = 401). Significant differences were found between nations with regards to the proportion categorized as being at risk for poor outcomes (27.5% for New Zealand (19/69) vs 54.4% for Canada (49/90) ; p = 0.001). On the Stanford Professional Fulfillment Index, 38.9% of the respondents were classified as being burned out (266/684). Prevalence of burnout ranged from 27% for Australia (20/74 up to 47.8% for Canadian respondents (43/90; p = 0.010). Younger age groups (20 to 29: RR 2.52 (95% confidence interval (CI) 1.39 to 4.58; p = 0.002); 30 to 39: RR 2.40 (95% CI 1.36 to 4.24; p = 0.003); 40 to 49: RR 2.30 (95% CI 1.35 to 3.9; p = 0.002)) and trainee status (RR 1.53 (95% CI 1.15 to 2.03 p = 0.004)) were independently associated with increased relative risk of having a 'at-risk' or 'burnout' score.

Conclusions

The rate of self-reported burnout and risk for poor outcomes among orthopaedic surgeons and trainees varies between countries but remains unacceptably high throughout. Both individual and health system characteristics contribute to physician wellness and should be considered in the development of strategies to improve surgeon wellbeing.
Level of Evidence: III

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Correspondence should be sent to Hassan Mir; email: hmir@floridaortho.com

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Introduction

Burnout and dissatisfaction with work-life balance in all specialties and at all stages of medical careers have been increasingly reported in the past few decades.[1-14] Burnout is characterized by a loss of enthusiasm for work (emotional exhaustion), feelings of cynicism (depersonalization), and a low sense of personal accomplishment.[15,16]

While physician burnout is recognized as a major issue, solutions remain elusive and rates appear to be increasing. The symptoms

of burnout among USA physicians are higher than in the general population, with 45% experiencing professional burnout in 2011 and increasing to 54% in 2014.[1,11,12] Over 40% of USA surgeons have been shown to have signs of burnout.[2-4,10,17] Within orthopaedic surgery, burnout has been reported to occur at alarming rates in multiple practice settings (40% to 60%), and has been found to be more prevalent in trainees and early career surgeons than in older surgeons.[18-32]

Several personal risk factors (e.g. age, sex, sleep, relationships, finances, substance abuse, stress contributors, etc.) and occupational risk factors (e.g. career stage, duty hours, call nights, additional duties, compensation, bullying, increased clerical burden, lawsuits, etc.) have been linked to burnout.[3,33-38] Burnout can lead to job performance issues and can deleteriously affect the individual physician and their patients (e.g. medical errors, professionalism, physician depression and suicide) as well as the healthcare system in which they practice (e.g. intent to leave, turnover, etc.).[1,39,40] However, several personal protective factors (e.g. meditation, mindfulness, yoga, religion, prayer, social activities, stress relief activities, etc.) and occupational protective factors (e.g. vacation time, physician wellness programs, workplace support, job control, etc.) have also been identified.[3,17,41,42]

Traditionally, perspectives on this issue have focused on the negative aspects of physician wellness (i.e. burnout). Physician wellness had been overwhelmingly operationalized as a mental phenomenon with less attention paid to the social, physical, and integrated dimensions of the construct. Physician wellness (or wellbeing) has more recently been defined by quality of life, which includes the absence of ill-being and the presence of positive physical, mental, social, and integrated wellbeing experienced in connection with activities and environments that allow physicians to develop their full potentials across personal and work-life domains.[43] More contemporary efforts are moving towards a broad view on all aspects of physician wellness including interventions.[8,9,16,42]

The most widely used instrument in prior studies on physician wellness is the Maslach Burnout Inventory (MBI).[15,16] There are several limitations of the MBI and other burnout instruments: they focus on the negative, do not track discrete points in time to measure the effects of interventions, and do not evaluate other aspects of wellbeing.[44] In response to these issues, newer instruments have been developed to assess physician wellness and move beyond the focus on burnout. The expanded Mayo Physician Well-Being Index[45] is a nine-item screening index to identify physicians with distress in a variety of dimensions and whose degree of distress may negatively impact their practice. The Stanford Professional Fulfillment Index[46] is a 16-item instrument to assess physicians' professional fulfillment and burnout, designed for sensitivity to change attributable to interventions or other factors affecting physician wellbeing.

Several prior studies have examined physician burnout in orthopaedic surgeons from different healthcare systems around the world.[22,24,25,28,32,47,48] However, no study to date has used newer wellness instruments (Mayo and Stanford) to examine trends and compare physician wellness among orthopaedic surgeons living and practicing in different countries.

Our objective was to describe and compare patterns of physician wellness in orthopaedic surgeons in multiple nations with varying health systems (USA, Canada, UK, Australia, and New Zealand) as assessed by the Mayo Clinic Physician Well-Being Index and the Stanford Professional Fulfillment Index. We hypothesized that prevalence of 'at-risk' or 'burnout' would vary significantly between nations with varying health systems and by other demographic factors.

Methods

Following Institutional Review Board review and exempt certification, this study was conducted via an online, anonymous survey study administered in the spring of 2019 through RedCap and Survey Monkey and managed at the corresponding author's site. The study was designed as a cross-sectional multinational survey and recruited participants from multiple locations in the USA, Canada, UK, Australia, and New Zealand. Each of the locations was selected because they were a host or home institution that participated in the 2019 American-British-Canadian (ABC) Traveling Fellowship programme. Each location had a designated contact that distributed the recruitment email/survey invitation to all orthopaedic surgery trainees (residents/fellows) and attending surgeons/faculty at their site with email reminders over a three month period from March 2019 to May 2019.

The survey began with a statement of voluntary consent. All data was entered anonymously, stored securely, and reported in aggregate to protect confidentiality at all times. Survey completion time was approximately 10 to 15 minutes for each participant. Each participant identified their nation and institution to allow their data to be attributed to the correct site.

Outcomes assessment. Two standardized measurements were selected to assess risk. The expanded Mayo Well-Being Index is composed of nine questions and considers a total score of ≥ 3 to indicate that the respondent is at risk of poor outcomes. The Stanford Professional Fulfillment Index consists of 16 questions. A subset of ten questions are used to generate the burnout scale score and an average score of 1.33 or higher classified a respondent has having 'burnout.' Our main outcome was considered present if a respondent scored as 'at-risk' on the Mayo WBI or as having 'burnout' on the Stanford PFI.

Table I. Demographic data by country.

Variable	Overall	Australia	Canada	New Zealand	UK	USA	p-value
Total, n	684	74	90	69	105	356	
Practice level, n (%)							
Trainee	293 (42.8)	12 (16.2)	44 (48.9)	7 (10.1)	41 (39.0)	189 (54.6)	< 0.001*
Attending	391 (57.2)	62 (83.8)	46 (51.1)	62 (89.9)	64 (61.0)	157 (45.4)	
Male, n (%)	577 (84.4)	66 (89.2)	67 (74.4)	64 (92.7)	83 (79.1)	297 (85.8)	0.007*
Age (yrs), n (%)							
20 to 29	97 (14.2)	2 (2.7)	18 (20)	0	5 (4.8)	72 (20.8)	< 0.001†
30 to 39	257 (37.6)	14 (18.9)	36 (40)	11 (15.9)	40 (38.1)	156 (45.1)	
40 to 49	145 (21.2)	23 (31.1)	18 (20)	26 (37.7)	29 (27.6)	49 (14.2)	
50 to 59	111 (16.2)	23 (31.1)	12 (13.3)	13 (18.8)	23 (21.9)	40 (11.6)	
60+	74 (10.8)	12 (16.2)	6 (6.7)	19 (27.5)	8 (7.6)	29 (8.4)	
Considered leaving orthopaedics, n (%)	221 (32.3)	16 (21.6)	37 (41.1)	21 (30.4)	47 (44.8)	100 (28.9)	0.003*
Would not recommend orthopaedics to kids, n (%)	197 (28.8)	22 (29.7)	48 (53.3)	22 (31.9)	37 (35.2)	68 (19.6)	< 0.001*
Considered leaving medicine, n (%)	309 (45.2)	27 (36.5)	37 (41.1)	35 (50.7)	54 (51.4)	156 (45.1)	0.253*
Would not recommend medicine to kids, n (%)	243 (35.5)	22 (29.7)	34 (37.8)	24 (34.8)	48 (45.7)	115 (33.2)	0.150*

*Fisher's exact test.
†Chi-squared test.

The authors reviewed existing literature to identify factors that have been associated with burnout/wellness, historically and in other populations, in order to compile a set of survey questions for future studies. In addition to the two standardized measures described above, the final iteration of the survey contained a total of 31 personal/demographic questions and 27 employment-related questions. The current study included only those participants who specified their country and completed both standardized assessments.

Demographic details. A total of 774 surgeons responded to the survey invitation, of which 14 opted out of participation in the study. From the remaining 760, our analytic cohort was composed of the 684 (90%) participants that completed both risk assessment questionnaires (Mayo and Stanford). Our study obtained responses from surgeons in five countries: Australia (n = 74), Canada (n = 90), New Zealand (n = 69), UK (n = 105), and USA (n = 346). Response rates were only known for two countries: USA (49%) and Canada (88%). Overall, 42.8% (n = 293) were trainees (residents or fellows) and 57.2% (391) were attending surgeons. The vast majority were men (84.4%; n = 577) and were between the ages of 30 to 50 (58.8%; n = 402). The most commonly reported practice types (more than one could be selected) were university (42.7%; n = 292), private practice (34.8%; n = 238), and hospital (33.9%; n = 232), and the most common subspecialties were arthroplasty (27.6%; n = 189), trauma (21.9%; n = 150), and general (20.5%; n = 140).

A total of 32.3% (n = 221) reported previous thoughts of leaving orthopaedic surgery and 45.2% (n = 309) reported having considered leaving medical practice entirely. There were significant differences in the distributions of training level, sex, and age by country of origin (Table I).

Statistical analysis. Descriptive statistics were tabulated and are reported as frequencies and percentages for categorical variables and as mean and ranges for continuous variables. Univariate analyses were performed with Fisher's exact and chi-squared tests for categorical variables and Kruskal-Wallis for continuous variables. Categories with fewer than ten responses per country were excluded from the relevant individual analyses. A multivariate modified Poisson model was used to estimate the relative risk (RR) and 95% confidence intervals (CI) for being 'at-risk' on the Mayo WBI or having 'burnout' on the Stanford PFI (either indicator was counted as having the outcome for statistical modelling). In analyses comparing countries, Australia was chosen as the referent as their respondents had the overall lowest percentage of 'at-risk'/'burnout' responses. To account for multiple comparisons by country in the primary outcome (being categorized as either 'at-risk' or 'burnout'), a p-value < 0.005 was considered statistically significant. STATA/SE v. 15.1 was used to perform all analyses (StataCorp,USA).

Results

Mayo Well-Being Index. On the Mayo Well-Being Index, 58.6% of the overall sample reported feeling burned out on the single item question (n = 401). The overall mean score across all respondents was 1.5 and ranged from -2 to 8. However, only 33.9% were categorized as being at-risk for poor outcomes (a total score of 3+ on the scale; n = 232). There were significant differences by country in the overall 'at risk' classification which ranged from about 27.5% for New Zealand (n = 19) to 54.4% for Canadian respondents (n = 49; p = 0.001, Fisher's exact test; Figure 1). When we examined the individual questions that comprised the total score, we found that 'work piling up- too much' and 'work

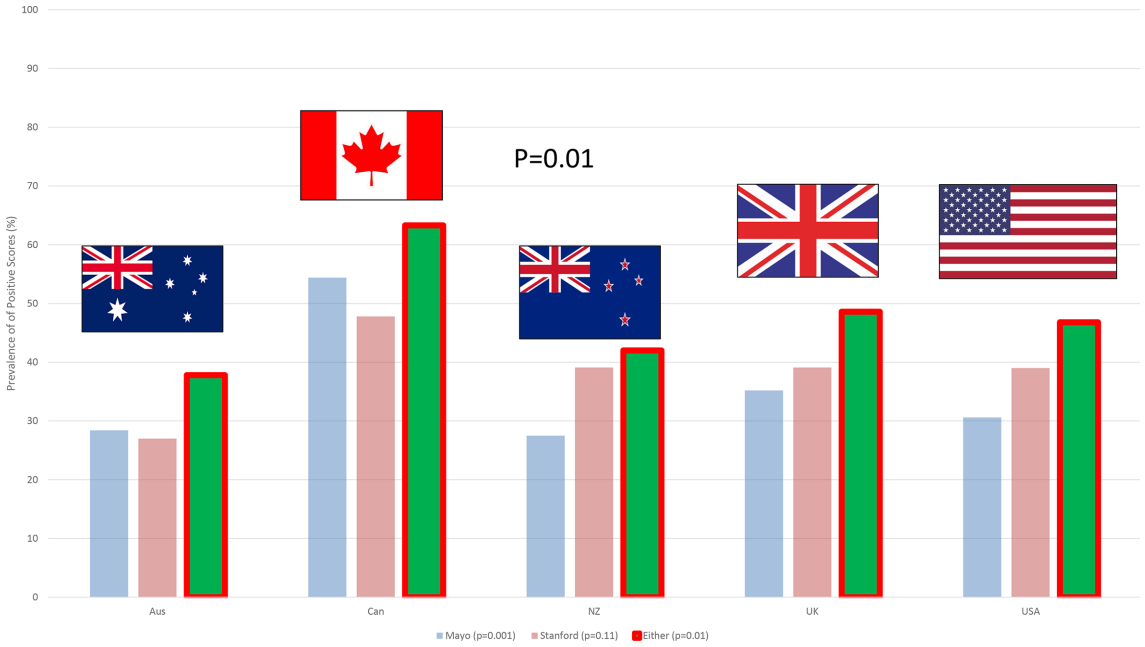

Fig. 1

National differences in prevalence of positive scores for 'at-risk' (Mayo) or 'burnout' (Stanford) by survey instrument.

schedule leaves me enough time for personal/family live' were the two questions that showed the greatest differences by country. For the first question, Australia (35.1%; n = 26) and New Zealand (39.1%; n = 27) were the lowest and Canada (64.4%; n = 58) was by far the highest. A similar pattern was observed with the latter question.

Stanford Professional Fulfillment Index. On the Stanford Professional Fulfillment index, the mean burnout scale score was 1.2 and ranged from 0 to 4. A total of 38.9% of the respondents were classified as being burned out (mean score of 1.33 or higher on the ten related items; n = 266). There was a significant difference in prevalence of burnout ranged from 27% for Australian (n = 20) up to 47.8% for Canadian respondents (p = 0.010, Fisher's exact test; Figure 1).

'At-risk' or 'burnout' on both instruments. When we examined the prevalence of flagged scores on both instruments, we noted that there was not 100% overlap between the Mayo and Stanford classifications (Figure 1). Among all respondents, 47.8% were flagged on at least one of the instruments (n = 327), but only 25% were scored as both 'at-risk' and 'burnout' (n = 171). We again noted significant variation by country for being flagged on either instrument (ranged from 37.8% for Australians (n = 20) up to 63.3% for Canadians; n = 57; p = 0.013, Fisher's exact test), as well as for being flagged on both instruments (ranged from 17.6% for Australians (n = 13) and 38.9% for Canadians (n = 35)).

Effect of demographic factors on prevalence of 'at-risk' or 'burnout' scores. An examination of the interplay of key demographic factors in the association between 'at-risk'/'burnout' (flagged on either measure) and country of practice revealed that risks were elevated for trainees, women, and younger age groups (See Figures 2 to 4).

Prevalence and usage of wellness programs. Overall, a little over one-third (37%; n = 253) of respondents indicated that their institution offered a physician wellness programme, while 40.5% (n = 277) were not sure whether a programme was offered. Among physicians reporting the existence of such a programme, only 21% have participated in it at least once (n = 53). There were significant differences by country, with low prevalence of wellness programs in Australia (10.8%; n = 8), New Zealand (14.5%; n = 10), and the UK (19.1%; n = 20) and higher prevalence in Canada (30%; n = 27) and the USA (54.3%; n = 188) (p < 0.001, chi-squared test). However, there was no statistical association between the presence of or participation in wellness programs and prevalence of 'at-risk' or 'burnout' scores on the risk assessments.

Multivariate regression models. In the multivariate regression models for relative risk of either flagged score, we found that country, age, sex, and training status were all independently associated with having either 'at-risk' or 'burnout' scores (See Table II). There was a negative correlation between age and likelihood of a respondent being 'at-risk' or having 'burnout.' Responding physicians in the 20 to 29 year-old group had more than double the risk (RR 2.52 (95% CI 1.39 to 4.58) of being either 'at-risk' or having 'burnout' compared to physicians who were 60+, after adjustment for country, sex and training status.

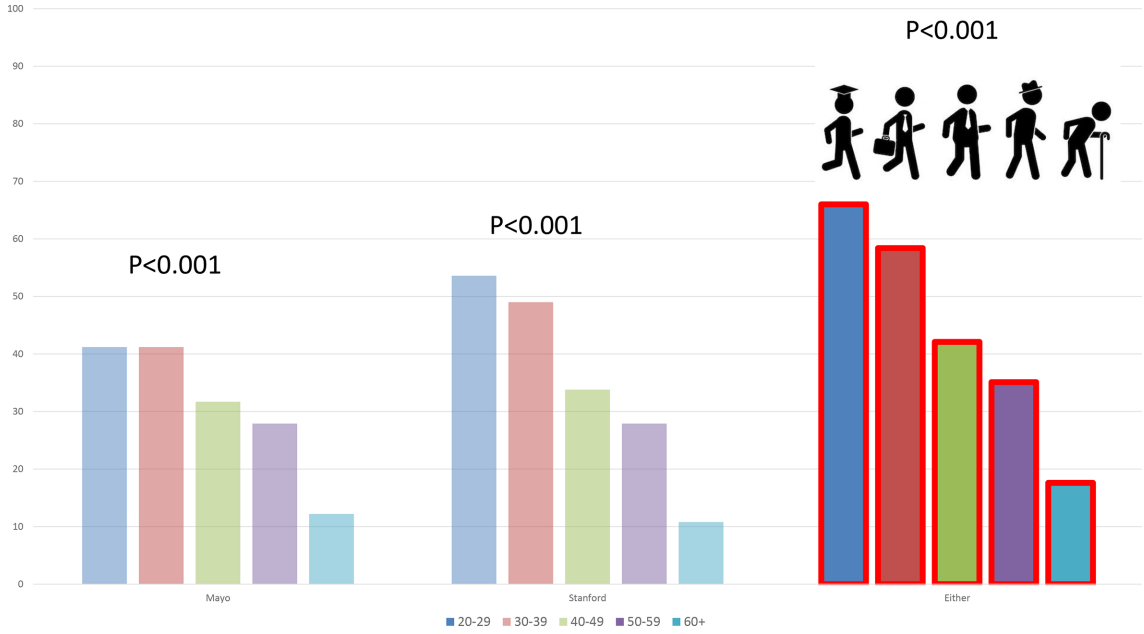

Fig. 2

Age differences in prevalence of positive scores for 'at-risk' (Mayo) or 'burnout' (Stanford) by survey instrument.

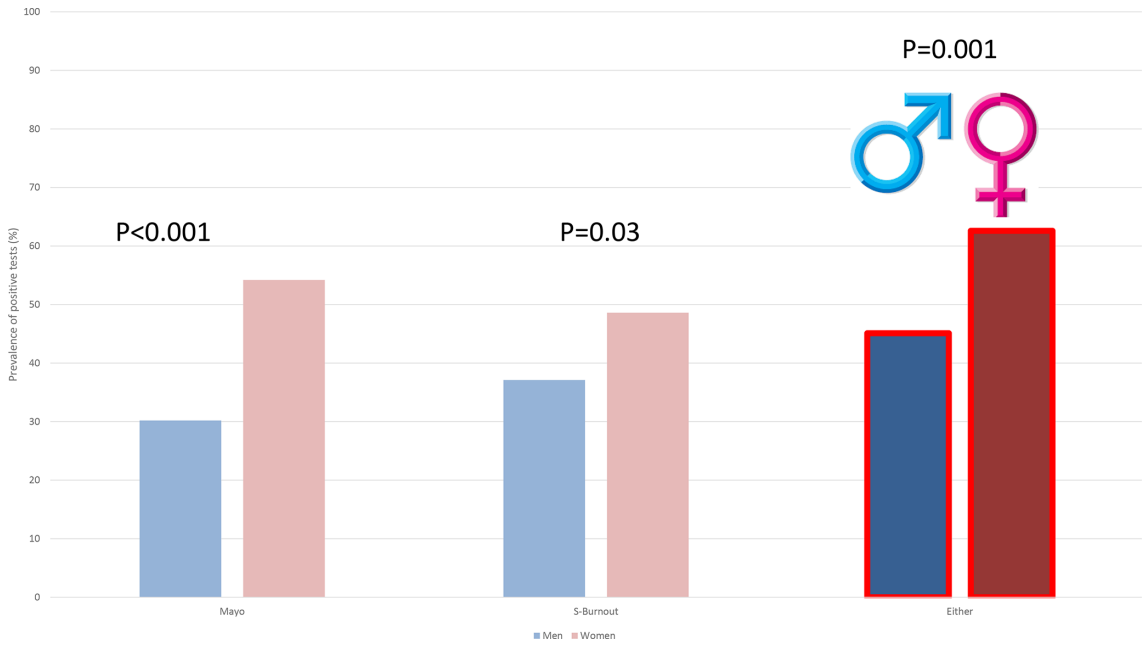

Fig. 3

Sex differences in prevalence of positive scores for 'at-risk' (Mayo) or 'burnout' (Stanford) by survey instrument.

Discussion

In this large cross-sectional survey study of orthopaedic surgeons and trainees across five countries, we found ubiquitously concerning rates of 'at-risk' and 'burnout' scores. While rates varied between countries, the differences were not statistically significant with the exception of higher RR of 'burnout' or 'at-risk' in Canadians (as defined by the Mayo Index) and New Zealanders (as defined by the Stanford Index). Independent associations were noted for age, sex, and trainee status. Rates also differed when evaluated by two different standardized assessment tools for wellbeing.

The explanation behind the observed differences in significant risk factors between the two instruments is not immediately clear. Technically speaking, the Mayo Well-Being Index generates a score that indicates whether the respondent is generally 'at-risk' of poor outcomes including, but not limited to, burnout. The Stanford

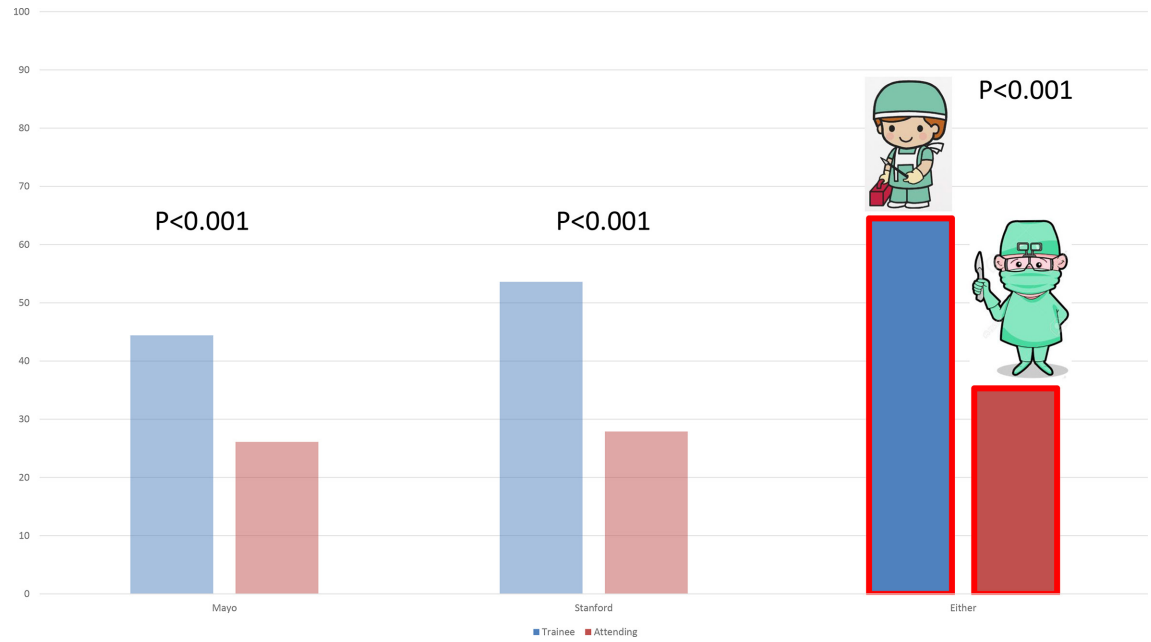

Fig. 4

Trainee versus attending differences in prevalence of positive scores for 'at-risk' (Mayo) or 'burnout' (Stanford) by survey instrument.

Table II. Multivariable regression modelled relative risk of either 'at-risk' or 'burnout'.

Variable	Relative risk (95% CI)	p-value*
Country		
USA	0.93 (0.68 to 1.27)	0.642
Australia	Ref	Ref
Canada	1.25 (0.90 to 1.74)	0.176
New Zealand	1.22 (0.84 to 1.79)	0.297
UK	1.04 (0.74 to 1.46)	0.815
Age (yrs)		
20 to 29	2.52 (1.39 to 4.58)	0.002
30 to 39	2.40 (1.36 to 4.24)	0.003
40 to 49	2.30 (1.35 to 3.90)	0.002
50 to 59	2.02 (1.16 to 3.50)	0.013
60+	Ref	Ref
Sex		
Male	Ref	Ref
Female	1.19 (1.00 to 1.41)	0.046
Training status		
Post-graduate Trainee	1.53 (1.15 to 2.03)	0.004
Attending	Ref	Ref

*Multivariable regression model.
CI, confidence interval.

Professional Fulfillment Index generates a score that indicates the respondent is specifically burned out. It is possible that the observed associations for the Mayo score picked up risks of possible poor outcomes other than burnout (eg. medical errors, disruptive behaviour, substance abuse, severe fatigue, end/change of career, suicidal ideation, divorce, or poor overall quality of life).

Trainee status was associated with worse scores on both instruments. This is concerning for several reasons. While previous workforce literature has demonstrated a greater prevalence of burnout symptoms in younger men and women, certain additional factors influencing trainee wellbeing may be unique to the training environment and more importantly, may be modifiable. In a previous systematic review, sleep deprivation, working in larger training programs, excessive workloads, long work hours, frequency of nights on-call, perception of work-related stress and stressful workplace relationships were all found to be associated with increased burnout risk.[49]

Younger surgeons in our study had a higher risk of burnout. Dyrbye et al[50] demonstrated that burnout risk among medical doctors varied with career stage, with the highest rates of burnout seen in the early and mid-career stages. As a result, these physicians/surgeons were more likely to leave medical practice for reasons other than retirement.[50] Trainees experiencing burnout or lacking wellbeing are also more likely to alter career paths.[51] The resulting attrition may lead to difficulties with succession planning, further exacerbating existing workload issues for the remaining surgeons and trainees. This is of particular concern in a speciality such as orthopaedic surgery where there is an increasing patient burden occurring with ageing populations.

The gender-related differences in this study pose an interesting conundrum.[52] If women in orthopaedic surgery (an overwhelmingly male-dominated speciality) are at higher risk of burnout or poor outcomes, then organizational/systemic changes must be of primary importance. The need to consider organizational interventions that would affect workplace environment and culture has been highlighted in a systematic review by Aronsson et al.[53] Higher levels of job support and workplace justice

were found to be protective against emotional exhaustion in physicians/surgeons. Conversely, high demands, low job control, high workload, low reward, and job insecurity increased burnout risk.

With respect to the varying healthcare systems in the five countries we surveyed, the only significant difference that emerged was the significantly higher burnout and 'at-risk' rates reported among respondents from Canada, the only fully single-payer healthcare system in the group. The lack of job control, relatively increased workloads and decreased financial rewards associated with a purely public medical system may be factors that contribute to this finding. These are important factors for leaders in organizations of public healthcare systems to address to maintain and optimize physician health and thereby, patient health.

The study was done in 2019, which is before the COVID-19 pandemic, therefore the results may be different than if the surveys were repeated during or after the pandemic. As this survey was conducted in conjunction with the American-British-Canadian Travelling Fellowship, all of the sites in Canada and USA were academic centres corresponding to the location of practice of the authors themselves. While we had high response rates in the USA (49%), and in Canada (88%), we were unable to calculate the response rates for the other nations as we were unable to gather the total number of survey invitations sent out. In addition, while the survey was distributed at several sites in the UK and broadly to membership of the Australian Orthopaedic Association (AOA) and New Zealand Orthopaedic Association (NZOA), sampling bias may have occurred as individuals associated with an academic centre may have been more likely to complete the surveys. As with all voluntary cross-sectional surveys, it is also possible that people with whom this issue resonated were more likely to complete the survey. In particular, it was noted that the proportion of respondents who were female exceeded the proportion of female representation known to exist within orthopaedics in the countries surveyed. This may explain the gender differences seen in this study that differ from those reported in previous studies. Finally, despite our large sample size, we cannot fully eliminate the possibility of Type I error occurring given the number of statistical comparisons being performed. The findings of this study should therefore be validated in other populations. Having said this, the overall findings of this study are consistent with previous literature in this area.

The reported risk of burnout on two validated indices for physician wellbeing is unacceptably high among orthopaedic surgeons and trainees in Australia, Canada, New Zealand, the UK and the USA. Various systemic and personal factors may modify this risk, both negatively and positively. Both organizational and personal interventions are likely necessary to reduce burnout risk, reduce poor outcomes, and improve physician wellness. This is an issue that leadership in healthcare organizations should consider in a timely fashion.

Take home message

- The rate of self-reported burnout and risk for poor outcomes among orthopaedic surgeons and trainees varies between countries but remains unacceptably high throughout.
- Both individual and health system characteristics contribute to physician wellness and should be considered in the development of strategies to improve surgeon wellbeing.

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Author information:
- H. Mir, MD, MBA, Orthopaedic Surgeon
- K. Downes, PhD, MPH, PhD Researcher
  Florida Orthopedic Institute, Tampa, Florida, USA.
- A. F. Chen, MD, MBA, Orthopaedic Surgeon, Department of Orthopaedics, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA.
- R. Grewal, MD, Orthopaedic Surgeon, Roth McFarlane Hand and Upper Limb Cente, University of Western Ontario, London, Canada.
- D. M. Kelly, MD, Orthopaedic Surgeon, Campbell Clinic Orthopaedics, Memphis, Tennessee, USA.
- M. J. Lee, MD, Orthopaedic Surgeon, Department of Orthopaedics, University of Chicago, Chicago, Illinois, USA.
- P. Leucht, MD, PhD, Orthopaedic Surgeon, Ortho Surgery & Cell Biology, NYU Langone Health, New York, New York, USA.
- S. K. Dulai, MD, MHSc, Orthopaedic Surgeon, University of Alberta, Edmonton, Canada.

Author contributions:
- H. Mir: Conceptualization, Project administration, Supervision, Methodology, Investigation, Data curation, Formal analysis, Validation, Visualization, Writing – original draft, Writing – review & editing.
- K. Downes: Conceptualization, Project administration, Supervision, Methodology, Resources, Investigation, Software, Data curation, Formal analysis, Validation, Visualization, Writing – original draft, Writing – review & editing.
- A. F. Chen: Conceptualization, Project administration, Methodology, Investigation, Writing – original draft, Writing – review & editing.
- S. K. Dulai: Conceptualization, Project administration, Methodology, Investigation, Writing – original draft, Writing – review & editing.
- R. Grewal: Conceptualization, Project administration, Methodology, Investigation, Writing – original draft, Writing – review & editing.
- D. M. Kelly: Conceptualization, Project administration, Methodology, Investigation, Writing – original draft, Writing – review & editing.
- M. J. Lee: Conceptualization, Project administration, Methodology, Investigation, Writing – original draft, Writing – review & editing.
- P. Leucht: Conceptualization, Project administration, Methodology, Investigation, Writing – original draft, Writing – review & editing.

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