Distress in orthopedic trainees and attending surgeons: a Canadian national survey

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Background: Physician health is of increasing concern in health care systems. The purpose of this study was to determine the prevalence of distress among orthopedic surgeons and trainees and to identify factors associated with distress.

Methods: Voluntary, anonymous online surveys were sent to attending orthopedic surgeons and orthopedic trainees across Canada. The survey for attending surgeons used the Expanded Physician Well-Being Index, and the survey for trainees used the Resident/Fellow Well-Being Index. Demographic information was also collected. To look for predictors of physician distress, we evaluated the relationship between respondents’ classification as “distressed” and “not distressed” against demographic factors.

Results: In total, 1138 attending orthopedic surgeons and 493 orthopedic trainees were invited to complete the survey. The survey response rate was 31.2% for attending orthopedic surgeons and 24.3% for orthopedic trainees. Overall, 55.4% of attending surgeons and 40.0% of trainees screened positive for distress. Among both attending surgeons and trainees, having dependents was not a risk factor for distress, nor was gender. Practice location was not a risk factor for distress among attending surgeons. Attending surgeons who were classified as distressed had spent significantly fewer years in practice (median 11 yr) than those who were classified as “not distressed” (median 16 yr) ($p = 0.004$).

Conclusion: We found a higher rate of distress among orthopedic surgeons than has been previously reported. The distress rate among orthopedic trainees in this population is similar to that reported in other international publications, although self-reported rates of burnout were higher. The findings from this study may indicate a need for continuing research to determine intrinsic and extrinsic risk factors for distress among orthopedic surgeons and trainees and for the evaluation of prescriptive, evidence-based initiatives to address this crisis.

Contexte : La santé des médecins est une préoccupation de plus en plus importante dans les systèmes de santé. Cette étude visait à déterminer la prévalence de la détresse chez les chirurgiens orthopédistes et les stagiaires en orthopédie, et à identifier les facteurs associés à la détresse.


Résultats : Au total, 1138 chirurgiens en exercice et 493 stagiaires ont été invités à remplir le sondage. Le taux de réponse était de 31,2% pour le premier groupe, et de 24,3% pour le second. En tout, 55,4% des chirurgiens et 40,0% des stagiaires présentaient des symptômes de détresse. Dans les 2 groupes, avoir des personnes à charge n’était pas un facteur de risque de la détresse; il en allait de même pour le genre. Le lieu de travail n’était pas un facteur de risque chez les chirurgiens. Les chirurgiens considérés comme étant en détresse avaient significativement moins d’années de pratique (médiane 11 ans) que ceux n’étant pas en détresse (médiane 16 ans; $p = 0.004$).

Conclusion : Le taux de détresse chez les chirurgiens orthopédistes était plus élevé que celui rapporté par le passé. Le taux de détresse chez les stagiaires sondés était similaire à celui présenté dans d’autres publications internationales, bien que le taux d’épuisement professionnel autodéclaré était plus élevé. Les conclusions de cette étude pourraient indiquer la nécessité de poursuivre la recherche sur les facteurs de risques intrinsèques et extrinsèques de la détresse chez les chirurgiens orthopédistes et les stagiaires en orthopédie ainsi que le besoin d’évaluer des initiatives prescriptives fondées sur des données probantes pour remédier à cette crise.
Physician health has become one of the most pressing concerns in modern health systems, and there is an increasing focus on conducting research, having discussions and developing strategies to address the problem of burnout. Maslach and colleagues defined burnout as a syndrome affecting human services workers that involves emotional exhaustion, depersonalization and a reduced sense of personal accomplishment.1 Physician health studies have shown that physicians meeting criteria for burnout were significantly more likely to report suboptimal patient care practices and attitudes2 and more likely to report having made medical errors.3 There is a limited but growing body of research regarding distress, burnout and mental quality of life in the specialty of orthopedic surgery. In 2009, a national survey of orthopedic residents and faculty in the United States was performed using a 119-item questionnaire. Thirty-two percent of the residents and 28.4% of the faculty who responded to the survey scored in the high range of emotional exhaustion, while 56% of the residents and 24.8% of the faculty scored in the high range of depersonalization.4 Other orthopedic studies have demonstrated rates of emotional exhaustion among orthopedic department leaders of 24%–28%.1,6 The aim of this study was to assess physician health in orthopedic surgeons and trainees in a national study in Canada.

**METHODS**

**Participants**

Email invitations were sent in November 2018 by the Canadian Orthopaedic Association to Canadian orthopedic residents and clinical fellows and to active attending orthopedic surgeons who were members of the Canadian Orthopaedic Association. Invitations were not sent to any members of the Canadian Orthopaedic Association who were in the association’s retired category. The survey was anonymous and voluntary.

The survey was administered through the US-based SurveyMonkey online portal. Three email invitations containing the link were sent over a 3-week period encouraging participation. Invitations to all francophone members were made in French but the survey was in English because the screening tools used in the questionnaire, the Expanded Physician Well-being Index (ePWBI) and the Resident/Fellow Well-being Index (PWBI) have not yet been validated in French. At survey completion, all attending surgeon and trainee respondents were given a link to a list of national physician health resources to access at their discretion.

**Survey instrument**

Historically, physician health studies have used the Maslach Burnout Inventory (MBI), 1 version of which is the MBI-Human Services Survey for Medical Personnel.1 This tool is typically used in the clinical setting by psychologists to diagnose burnout. It is a 22-item questionnaire that takes 10–15 minutes to complete. The tool is considered to be the gold standard for diagnosing burnout. However, we felt that the length of time required to complete such a questionnaire would be a significant barrier to obtaining a meaningful response rate in a population of Canadian orthopedic surgeons. Furthermore, most instruments to evaluate physician health are long and evaluate only 1 domain, such as fatigue or burnout, rather than including other domains.7

In view of challenges related to obtaining adequate survey response rates in physician groups, we used validated comprehensive screening tools to assess distress in attending orthopedic surgeons and orthopedic trainees, which included the domains of burnout, depression, stress, fatigue, and mental and physical quality of life. The 9-item ePWBI (MedEd Web Solutions) was used for attending orthopedic surgeons and the 7-item PWBI (MedEd Web Solutions) was used for orthopedic trainees.8 Both tools, developed at Mayo Clinic, have been previously validated in groups of medical trainees and attending physicians.7,9 The 9-item ePWBI includes items exploring satisfaction with work–life integration and meaning in work, because these factors are known to be protective against burnout.9 Both survey tools require less than 2 minutes to complete.

In the survey of orthopedic attending surgeons, the following demographic characteristics were included: gender, number of years in practice, employment status, academic versus non-academic affiliation practices and whether the respondent had dependents under the age of 18 years.

In the survey of orthopedic trainees, the following demographic characteristics were included: gender, level of training (to categorize respondents as residents or clinical fellows) and whether the respondent had dependents under the age of 18 years.

For the PWBI, a score of 5 or above was interpreted to indicate that the respondent was distressed because in a sample of 6880 US physicians, respondents with a threshold score at or above 5 had a 4-fold increase in their risk of burnout, a 2-fold increase in their risk of suicidal ideation and a 3-fold increase in their risk of poor mental quality of life.10 For the ePWBI, a score of 3 or above was interpreted to indicate that the respondent (surgeon) was distressed because in a sample of 6880 US physicians, respondents with a threshold score at or above 3 had a 5-fold higher risk of burnout, a 4-fold higher risk of severe fatigue, a 2-fold higher risk of reporting having recently made a medical error, a 3-fold higher risk of poor overall quality of life and a 2-fold higher risk of suicidal ideation.9

**Statistical analysis**

We calculated the PWBI and ePWBI scores for each respondent using survey tools. Statistical analysis was
performed on the data from all fully completed questionnaires as well as from any partially completed questionnaires, as some demographic data were missing in a few respondent data sets. One-way analysis of variance was used to compare mean ePWBI scores for male and female attending surgeons. Independent-samples t tests were used to compare mean PWBI scores between trainee groups (residents v. fellows). In the attending surgeon group, the Kruskal–Wallis test was used to compare median years in practice between surgeons who were distressed and those who were not distressed. Cross-tabulation and χ² analysis were used to compare all other factors. For all comparisons, p values less than 0.05 were considered statistically significant.

**Ethics approval**

Approvals for the study were obtained from the Canadian Orthopaedic Association (COA) Continuing Professional Development Committee and from the research ethics board at Sunnybrook Health Sciences Centre, an academic health centre located in Toronto, Canada.

**Results**

**Attending orthopedic surgeons**

A total of 1138 attending orthopedic surgeons were invited to participate in the survey, and 355 responded (survey response rate 31.2%). The demographic characteristics of the respondents are listed in Table 1, and the percentages of respondents who endorsed each ePWBI survey item are listed in Table 2. The mean ePWBI score for all attending surgeons was 2.72 (standard deviation [SD] ± 2.40). Overall, 197 attending surgeons (55.4%) were in the distressed category, with high ePWBI scores (high risk of burnout, low mental quality of life, medical error, suicide). For male attending surgeons, the mean ePWBI was 2.66 ± 2.36 and for female attending surgeons it was 2.93 ± 2.60. The mean ePWBI score for attending surgeons who identified their gender as “other” was 3.5 ± 0.71. One-way analysis of variance showed no statistically significant difference among mean ePWBI scores across genders (p = 0.64).

When χ² analyses were performed, the following factors were not associated with attending surgeon distress: having dependents younger than 18 years of age (p = 0.28), type of practice setting (academic v. community) (p = 0.94) and employment status (p = 0.43). All 69 female attending surgeon respondents reported having dependents younger than 18 years of age, and as such we were unable to compare ePWBI scores for female respondents who were parents and those who were not parents.

The 197 attending surgeons who met the ePWBI threshold score for distress had been in practice for a median of 11 years (range 0–38 yr). Attending surgeons whose score was below the threshold had been in practice for a median of 16 years (range 0–43 yr). There was a significant difference in the median number of years in practice between these 2 groups (p = 0.004), suggesting that a longer time in practice is associated with lower rates of distress. Although 65.2% of all attending surgeon respondents (231/354) selected “very strongly agree” or “strongly agree” in response to the statement “The work I do is meaningful to me,” 42.0% of them were classified as being distressed on the basis of their ePWBI score.

**Orthopedic trainees**

Of the 493 orthopedic trainees invited to complete the survey, 120 responded (response rate 24.3%). The demographic

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**Table 1. Demographic characteristics of attending surgeon respondents**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%) of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>282 (79.4)</td>
</tr>
<tr>
<td>Female</td>
<td>71 (20.0)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (0.6)</td>
</tr>
<tr>
<td>Dependents &lt; age 18 yr</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>198 (56.1)</td>
</tr>
<tr>
<td>No</td>
<td>155 (43.9)</td>
</tr>
<tr>
<td>Practice setting</td>
<td></td>
</tr>
<tr>
<td>Community</td>
<td>179 (50.4)</td>
</tr>
<tr>
<td>Academic</td>
<td>176 (49.6)</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
</tr>
<tr>
<td>Not employed</td>
<td>17 (4.8)</td>
</tr>
<tr>
<td>Employed</td>
<td>338 (95.2)</td>
</tr>
</tbody>
</table>

**Table 2. Responses of attending orthopedic surgeons to items in the Expanded Physician Well-Being Index**

<table>
<thead>
<tr>
<th>Item</th>
<th>% of respondents endorsing item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distressed attending surgeons</td>
</tr>
<tr>
<td>During the past month:</td>
<td></td>
</tr>
<tr>
<td>1. Have you felt burned out from your work?</td>
<td>77.1</td>
</tr>
<tr>
<td>2. Have you worried that your work is hardening you emotionally?</td>
<td>80.5</td>
</tr>
<tr>
<td>3. Have you often been bothered by feeling down, depressed or hopeless?</td>
<td>93.0</td>
</tr>
<tr>
<td>4. Have you fallen asleep while stopped in traffic or driving?</td>
<td>71.0</td>
</tr>
<tr>
<td>5. Have you felt that all the things you had to do were piling up so high that you could not overcome them?</td>
<td>75.0</td>
</tr>
<tr>
<td>6. Have you been bothered by emotional problems (such as feeling anxious, depressed or irritable)?</td>
<td>76.9</td>
</tr>
<tr>
<td>7. Has your physical health interfered with your ability to do your daily work at home and/or away from home?</td>
<td>88.3</td>
</tr>
</tbody>
</table>
characteristics of the respondents are listed in Table 3. Forty percent of trainee respondents screened positive for distress as indicated by their PWBI score and thus were at high risk of burnout, low mental quality of life, medical error and suicide. When the results were analyzed by gender, 41.5% of male trainees and 36.8% of female trainees screened positive for distress. For all trainees, the mean PWBI score was 3.85 ± 2.07. Men had a mean PWBI score of 3.93 ± 2.09 and women had a mean PWBI score of 3.68 ± 2.05. There was no significant difference between genders in terms of mean PWBI score (p = 0.55) nor in terms of the frequency of PWBI scores above the risk threshold for distress (p = 0.63). The percentages of trainee respondents who endorsed specific items in the PWBI are listed in Table 4.

When χ² analyses were performed, there was no association between having distress and being a parent (p = 0.92), nor was there a significant association between PWBI score and level of training when residents and fellows were compared (p = 0.57).

## Discussion

Physician health has become a priority for physician advocacy organizations as well as for health care systems. There is a growing body of literature demonstrating quality of care may decrease when the physician population is distressed.2,11,12 Physician distress may take many forms, including burnout, fatigue, stress or anxiety, poor mental quality of life and poor physical quality of life.7

It is challenging to compare Canadian data with the results of the few previously published studies of the health of orthopedic surgeons4,13–15 because the outcome tools used are not identical. However, in a study using ePWBI, 39.3% of the more than 7000 physicians who participated were found to be distressed, which corresponds closely with the most reported population rates of physician burnout.8,9 Similarly, our findings demonstrated a distress rate among orthopedic trainees of 40.0% and a self-reported burnout rate of 68.3%. In a recent study in France, 40% of orthopedic and trauma trainee respondents scored positively for burnout, and 10% admitted to experiencing suicidal ideation in the 12 months before the study.15

In a study that included up to 8000 American surgeons from various subspecialties, a 40% burnout rate was reported.16 Prior studies have suggested burnout rates of up to 56% in orthopedic trainees and up to 28% in attending orthopedic surgeons and faculty.6,13 Likewise, in a large US physician population, 39.3% of physicians screened positive for distress in a study using ePWBI.9 The 55.4% distress rate among orthopedic surgeons in our population was notably higher. Furthermore, 65.4% of attending surgeon respondents in our population self-reported feeling burned out in the past month. These rates of burnout are notably higher than previous published data for orthopedic attending surgeons. Potential factors accounting for this discrepancy deserve further study. Young Canadian orthopedic surgeons often face a challenge finding permanent employment even though Canada has relatively low numbers of orthopedic surgeons per capita compared with other countries.17 This leaves individual surgeons with a greater burden of on-call work. The stress of practice management in the context of difficult access to elective surgeries in Canada may also play a role in burnout.

Factors that have been independently associated with burnout in US surgeons include young surgeon age,16,18 having children,19 a higher number of hours worked per week,4,18,20 and compensation being based entirely on billing.19 In our population of attending orthopedic surgeons, we found that fewer years in practice was a risk factor for distress. This finding is consistent with a prior orthopedic study showing higher levels of emotional exhaustion in orthopedic surgeons with fewer years in practice.14 Being a
parent was not a risk factor for distress among our orthopedic trainee or attending orthopedic surgeon respondents. The role of gender remains less clear. Several published studies of surgeon populations have shown female gender to be a risk factor for burnout among orthopedic and other surgeon populations. In contrast, other studies in orthopedic and other surgeon populations have not demonstrated gender to be a risk factor. In our study population, gender was not a risk factor for distress. High levels of meaning in work are known to be protective against some domains of distress. Sixty-five percent of our attending orthopedic surgeon respondents stated that their job was highly meaningful; however, 42% of that subgroup of surgeons still screened positive for distress.

Current Canadian initiatives to assist with physician health include support programs through most provincial and territorial medical associations. Increasingly, departments of medicine are establishing vice chairs of physician wellness, and provincial wellness initiatives are being implemented across Canada.

To our knowledge, this is the first Canadian national investigation of burnout and well-being among orthopedic surgeons using a validated outcome tool. It shows the prevalence of this issue, and the results are concerning. Although historic data have shown trainees to be at the highest risk for distress, our results suggest that the risk of distress in our population of orthopedic attending surgeons is at least similar, if not higher.

Limitations

The main limitation of this survey is the moderately low response rates, which may have led to a response bias and an overrepresentation of the rates of distress. However, the response rates for this survey are similar to those of other physician health studies. In comparison, the recent Canadian Medical Association national health survey of physicians had a response rate of 8.5%. Other national surveys of trainee physician health with similar distribution methods have had response rates of 21% for both American emergency medicine residents and American neurosurgery residents. In the Canadian surgical training setting, it has been noted previously that in-training examinations can have a major effect on trainee stress. This survey was sent out 1 week before the orthopedic in-training examination for Canadian residents as well as twice over the 2 weeks following the examination. Thus, we do not think the timing of survey distribution played a role in the response rate. Finally, this study does not provide any information on risk factors that can be modified to prevent distress.

Conclusion

Future research studies may be focused on determining modifiable factors associated with distress in orthopedic attending surgeons and trainees. Factors may be intrinsic to the profession or they may be extrinsic, involving the health care systems in which these professionals train and work. Understanding these factors may guide a more prescriptive approach to combating this challenge in the orthopedic surgery profession.

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Contributors: C. Kollias designed the study, acquired the data, performed some data analysis and wrote and critically reviewed the article. T. Okoro performed data analysis and critically reviewed the article. T. Tufescu designed the study and critically reviewed the article. V. Wadey designed the study, acquired the data, assisted with analyzing the data and critically reviewed the article. All authors approved the final version for publication.

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