

High burnout among the South African orthopaedic community: a cross-sectional study

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Abstract

Background

Burnout is epidemic among physicians, with the orthopaedic speciality displaying one of the highest rates of burnout in international studies. The burnout rate of the South African orthopaedic community is unknown. This study aimed to determine the prevalence and causes of burnout, as well as the coping mechanisms and associations with burnout, in South African orthopaedic surgeons and trainees.

Methods

We conducted a cross-sectional, secure, online survey of members of the South African Orthopaedic Association. The survey assessed demographic characteristics, workload, professional fulfilment and burnout (utilising the Stanford Professional Fulfilment Index), associated workplace distress conditions, causes of and coping strategies for burnout. A response was not compulsory for any question. Statistical analysis was performed to assess for independent associations with burnout.

Results

One hundred and fifty-six respondents, with a median age of 46.5 years (interquartile range [IQR] 37–58) participated. Ninety per cent (139 of 155) of respondents were male. Registrars accounted for 17% (27 of 155), while 83% (128 of 155) were qualified specialists. Respondents were in orthopaedic practice for a median of 17 years (IQR 9–28). Sixty per cent (76 of 127) practise in private, 17% (22 of 127) in public and 23% (29 of 127) in both sectors. The overall burnout rate was 72% (113 of 156). Burnout was associated with being the parent of young children and having fewer hours of sleep on call. Registrars were more likely to have burnout than consultants (OR 5.68, 95% CI 1.3–25.2). Gender, practice setting and subspeciality were not associated with burnout. Self-reported causes of burnout that were found to be associated with actual burnout were: 'hours at work', 'lack of free time' and 'work–life imbalance'. No self-reported coping mechanisms were found to be protective in this cohort, but the use of alcohol as a coping mechanism was associated with an increased likelihood of burnout (OR 3.9, 95% CI 1.4–10.7). Respondents felt that the concurrent experience of the COVID pandemic at the time of running the survey reduced their experience of burnout.

Conclusion

The burnout rate in the South African orthopaedic community is 72%. Trainees were found to be particularly vulnerable. There appears to be a need to develop, assess and implement effective system-related initiatives aimed at reducing the burnout rate among orthopaedic surgeons and trainees in South Africa.

Level of evidence: Level 4

Keywords: burnout, orthopaedic, South Africa, professional fulfilment, Stanford Professional Fulfilment Index, moral injury, compassion fatigue, imposter phenomenon, second victim syndrome, approval addiction

Introduction

Burnout is described in the International Classification of Disease (ICD) 11th revision as an occupational phenomenon resulting from chronic workplace stress.¹ The syndrome is described as having three components: emotional exhaustion (lack of enthusiasm for work), depersonalisation (cynicism) and lack of professional satisfaction (low sense of personal accomplishment).²⁻⁷ More than two decades of research have expounded the epidemic, which has notably affected the health professions disproportionately.⁸

Burnout is particularly relevant in the health professions, due to the numerous downstream effects on the health system, on patients, and on the individual themselves. The estimated cost of burnout to the US health system is \$4.6 billion annually.⁹ This is due to higher staff turnover, staff attrition, early retirement, reduced work effectiveness and professionalism, absenteeism and presenteeism (being at work when one should be off sick).^{4,5,7-11} Physicians experiencing burnout have displayed higher rates of depression and suicidal ideation, broken relationships, increased alcohol and drug use, reduced work satisfaction, altered prescribing habits and test ordering, increased risk of medico-legal lawsuits and reduced cognitive ability.⁷⁻¹³ Physical health can also be affected as burnout can result in higher rates of diabetes mellitus, cholesterol, pain, fatigue, cardiovascular disease and early death.^{7,11}

Within the branches of medicine, orthopaedic surgeons in the USA have one of the highest burnout rates.⁴ Various international studies have demonstrated burnout rates of between 16% and 85%.^{3-5,7,14} This variability is similar to that seen among general surgeons, and can be accounted for by differing career stages, workload, work hours and number of calls.^{2,4,7} Orthopaedic trainees are at higher risk, with reports suggesting work hours, electronic medical records (EMR), lack of sleep and lack of supportive mentors as common predisposing factors.^{5,15} Two studies identified female orthopaedic surgeons as being at greater risk of experiencing burnout.^{15,16}

Despite the paucity of data on physician burnout in low- and middle-income countries (LMICs), much work has been done in South Africa (RSA) to assess the prevalence of burnout among doctors.¹⁷ A national study found higher rates of burnout in medical doctors than comparative international figures.¹⁸ Studies from various provinces reported rates between 52% and 100% in doctors of varying career levels and specialities, with none of these investigating orthopaedic surgeons exclusively.^{6,19-22}

We aimed to determine the burnout rate in South African orthopaedic surgeons and trainees. In addition, we wanted to evaluate the perceived causes and coping mechanisms, screen for the presence of associated workplace distress conditions, determine the social impact of burnout and determine the independent risk factors for the development of burnout in this cohort. While not a primary aim, we also evaluated the impact of the COVID pandemic on burnout.

Methods

This cross-sectional study was performed by way of a ten-minute online survey. The survey was administered using Checkbox® Survey Software (© Checkbox Survey, Inc. 2002–2021). The questionnaire comprised six sections, namely, demographics, workload, the Stanford Professional Fulfilment Index (PFI), screening questions for associated workplace distress conditions, perceived causes of burnout and coping strategies for burnout. In considering the COVID pandemic and its potential effect on burnout, each section concluded with a question to determine if the pandemic had affected the response. There was a single open-ended question. The remaining questions required numerical answers or selection of appropriate single or multiple options.

The Stanford PFI is a validated assessment tool comprising 16 questions scored on a 5-point Likert scale of agreement; four questions aimed at establishing the presence of work exhaustion (WE); and six for interpersonal disengagement (ID). If the combined average score for these two variables was calculated at 1.33 or greater, it constituted burnout.¹⁰ The other six questions assessed professional fulfilment (PF). Respondents were deemed professionally fulfilled if they scored an average of three points or greater for these six questions.¹⁰

Five additional workplace distress conditions may be associated with burnout. 'Moral injury' is defined as the distress caused in a person that arises from the challenge of simultaneously knowing what care patients require but being unable to provide it due to constraints that are beyond their control.²³ 'Compassion fatigue' is 'the change in empathetic ability of the caregiver in reaction to the prolonged and overwhelming stress of caregiving'.²⁴ 'Approval addicts' are those whose self-esteem is attached to how other people perceive them.²⁵ 'Imposter phenomenon' is when a person has the psychological belief that they are a fraud, and fear being recognised as an imposter, despite objective evidence of success.²⁶ The fifth condition, termed 'second victim syndrome', is used to characterise the feeling of responsibility that a healthcare worker experiences when a medical error occurs.²⁷ For each of these conditions, a single or multiple questions were adapted from existing validated scores, or formulated from defining characteristics of the syndrome, for the purpose of screening for each of the conditions.^{25,27-30}

All the members of the South African Orthopaedic Association (SAOA) with listed email addresses were eligible to participate. Invitations were emailed to members, with an attached link to the secure online survey. To proceed with the survey, respondents had to consent to participation, after reading an information page on the nature of the study. Survey responses were completely anonymous, and respondents were limited to a single response. The survey was run for a total of six weeks over May and June 2021. Two reminders were sent using the same platform at two-weekly intervals. No questions were compulsory to complete; however, the PFI section was completed by all respondents.

The survey responses were exported to Microsoft® Excel for Mac, Version 16.50 (21061301), where descriptive statistics were summarised and the open-ended question encoded by the general theme of response. Non-parametric continuous variables were summarised as medians with interquartile range (IQR), and categorical variables were expressed as percentages with counts. Statistical analysis was performed with jamovi statistical software (version 1.6.23.0).³¹ Univariate binomial logistic regression was employed to assess the associations of the risk factors with the presence of burnout. A multiple regression model was developed using reverse stepwise elimination to determine independently associated variables. Significance was set at $p < 0.05$.

Results

Demographic details

Of the SAOA members contacted, 960 had active email addresses. One hundred and fifty-six members completed the survey, constituting a response rate of 16%. The median age of respondents was 46.5 years (IQR 37–58). Ninety per cent of respondents (139 of 155) were male, and 10% were female (16 of 155). Qualified orthopaedic surgeons constituted 83% of the sample (128 of 155), and 17% (27 of 155) were registrars. Sixty per cent of the specialists were private practitioners (76 of 127), 17% (22 of 127) practised exclusively in the public sector, and 23% reported working in both public and private (29 of 127). The median number of years in practice was 17 (IQR 9–28).

Table 1: Descriptive statistics for respondent demographic characteristics

	Counts (n)	% of total	Median	IQR
Age (years)	156		46.5	37–58
Sex				
Female	16 (155)	10%		
Male	139 (155)	90%		
Qualification				
Specialist	128 (155)	83%		
Registrar	27 (155)	17%		
Years in practice	156		17	9–28
Year of registrar time	27		3	2–4
1st	6 (27)	22%		
2nd	4 (27)	15%		
3rd	8 (27)	30%		
4th	3 (27)	11%		
5th	6 (27)	22%		
Practice setting				
Public	22 (127)	17%		
Private	76 (127)	60%		
Both	29 (127)	23%		
Subspeciality				
General	14 (115)	12%		
TSR	12 (115)	10%		
Paediatrics	7 (115)	6%		
Trauma	12 (115)	10%		
Spine	8 (115)	7%		
Foot & ankle	12 (115)	10%		
Shoulder & elbow	22 (115)	19%		
Hands	13 (115)	11%		
Arthroplasty	38 (115)	33%		
Are you in a relationship?				
Yes	143 (153)	94%		
No	10 (153)	7%		
How many children do you have?	156		2	1–3
How old is the youngest child?	122		11	4–23
How old is the oldest child?	113		16	9–29
How supportive is your partner?				
Least supportive	2 (142)	1%		
Minimally supportive	1 (142)	1%		
Moderately supportive	6 (142)	4%		
Largely supportive	34 (142)	24%		
Maximally supportive	99 (142)	70%		
Whose career is prioritised?				
Mine	86 (140)	61%		
Equally important	53 (140)	38%		
Other	1 (140)	1%		
Who is primarily responsible for childcare?				
Me	3 (123)	2%		
My partner	41 (123)	33%		
Both	66 (123)	54%		
Other	13 (123)	11%		

Continuous or ordinal variables expressed as medians with interquartile range (IQR). Categorical variables expressed with counts and percentages of total. TSR: tumour, sepsis and reconstruction

Specialists could record more than one response for speciality. ‘Sport’, ‘hip’ and ‘knee’ results were grouped under arthroplasty. Similarly, ‘reconstruction’ and ‘deformity correction’ were included under ‘tumour, sepsis and reconstruction’ (TSR), ‘upper limb’ responses were counted under both ‘shoulder and elbow’ as well as ‘hand’ groups. Twelve per cent of respondents reported being generalists (14 of 115), 10% TSR (12 of 115), 6% paediatrics (7 of 115), 10% trauma (12 of 115), 7% spines (8 of 115), 10% foot and ankle (12 of 115), 19% shoulder and elbow (22 of 115), 11% hands (13 of 115) and 33% arthroplasty (38 of 115). *Table 1* summarises the demographic details of respondents.

Relationship factors

Of the entire group, 94% (143 of 153) reported being in a relationship. Ninety-four per cent of the respondents reported that

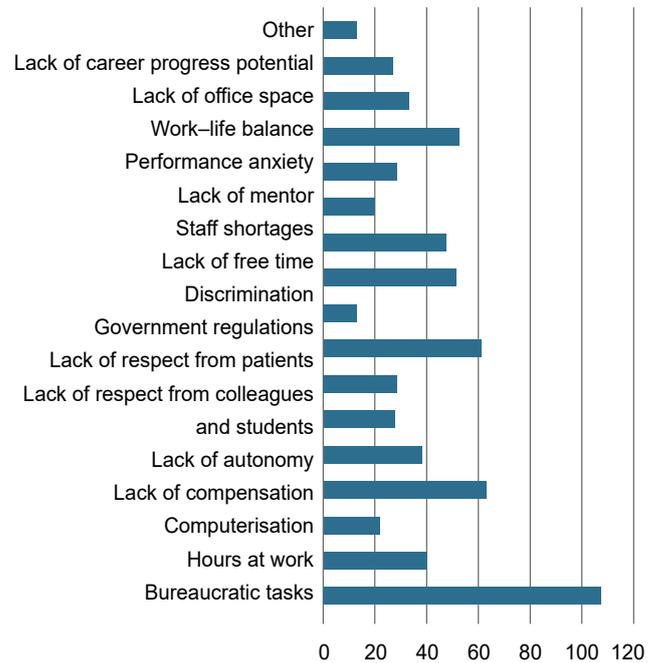


Figure 1. Graphic representing respondents' self-reported causes for burnout (counts, n = 153)

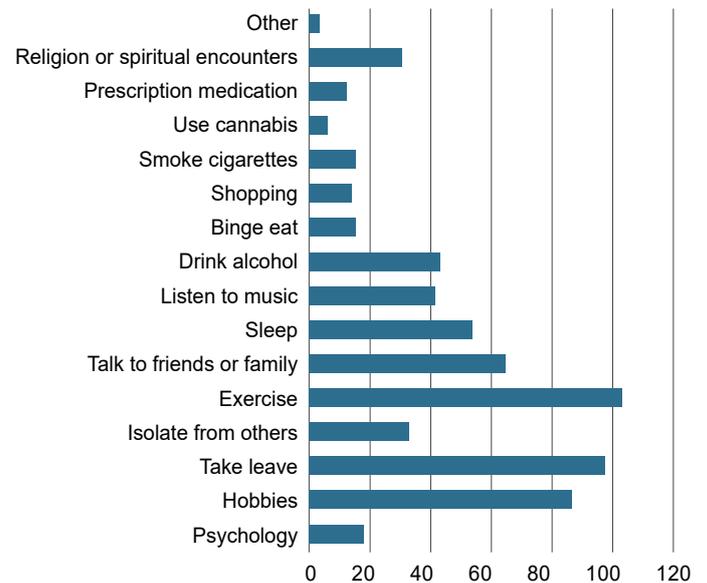


Figure 2. Graphic representing respondents' self-reported strategies for managing burnout (counts, n = 155)

Table II: Work distribution, work hours, call-related characteristics, sport and hobby participation of respondents

Work distribution	Count (n) %	Count (n) %	Count (n) %	Count (n) %	Count (n) %
Percentage of time allocated to:	Clinic & ward round	Surgery	Admin	Teaching	Research
< 10%	8 (156) 5%	8 (156) 5%	49 (154) 32%	96 (133) 72%	112 (134) 84%
20%	18 (156) 12%	19 (156) 12%	65 (154) 42%	26 (133) 20%	14 (134) 10%
30%	36 (156) 23%	48 (156) 31%	21 (154) 14%	7 (133) 5%	7 (134) 5%
40%	45 (156) 29%	49 (156) 31%	7 (154) 4%		1 (134) 1%
50%	27 (156) 17%	19 (156) 12%	5 (154) 3%	3 (133) 2%	
60%	16 (156) 10%	9 (156) 6%	5 (154) 3%		
70%	4 (156) 3%	1 (156) 1%	1 (154) 1%		
80%	2 (156) 1%	3 (156) 2%	1 (154) 1%	1 (133) 1%	
Work hours and calls					
Average hours at work per week					
0–20	7 (156) 5%				
20–30	7 (156) 5%				
30–40	32 (156) 21%				
40–50	54 (156) 35%				
50–60	39 (156) 25%				
60–70	14 (156) 9%				
70–80	2 (156) 1%				
> 80	1 (156) 1%				
Average hours working at home per week					
< 5	64 (156) 41%				
> 5	37 (156) 24%				
> 10	32 (156) 21%				
> 15	13 (156) 8%				
> 20	10 (156) 6%				
Number of calls on weekdays					
0–2	47 (155) 30%				
2–4	62 (155) 40%				
4–6	34 (155) 22%				
6–8	6 (155) 4%				
> 8	6 (155) 4%				
Number of calls on weekends					
0–2	119 (155) 77%				
2–4	36 (155) 23%				
Leisure activities					
		Median	IQR	Count	
How many hours per week do you do sport?		3	1–4	155	
How many hours per week do you do hobbies?		5	3–10	156	
Average hours of sleep not on call		7	6–7	156	
Average hours of sleep on call		6	4–7	136	

Categorical variables were expressed as frequencies and percentages. Continuous variables were expressed as medians with interquartile ranges
IQR: interquartile range

their partner was largely or maximally supportive (133 of 142). Sixty-one per cent of respondents reported that their career was prioritised (86 of 140). No one reported prioritising their partner's career, and 38% reported equal career importance (53 of 140). There were three single parents in this cohort. Respondents had a median of two children (IQR 1–3). Two per cent of respondents (3 of 123) were the primary caregivers. In 33% of cases (41 of 123), the partner was the primary caregiver and 54% of the time, responsibility was shared (66 of 123). The option 'other' was reported by 11% of respondents.

Working hours

Thirty-five per cent of respondents reported working between 40 and 50 hours per week (54 of 156), 25% worked between 50 and 60 hours (39 of 156), and 31% 40 hours (46 of 156) or less. Eleven per cent work more than 60 hours a week (17 of 156). Most respondents reported that outpatient clinics, together with ward rounds or surgery, accounted for between 30% and 40% of the workload on average, followed by administration (20%), while teaching and research each contributed less than 10%. Forty per cent of respondents reported between two and four weekday calls

Table III: Stanford Professional Fulfilment Index (PFI) questions and scores broken down into each of the three sub-categories and summarised overall burnout results

	Average score	Category	Counts (n)	% of total
Professional fulfilment*	3.82			
I feel happy at work	3.54			
I feel worthwhile at work	3.85			
My work is satisfying to me	3.89			
I feel in control when dealing with difficult problems at work	3.63			
My work is meaningful to me	4.21			
I'm contributing professionally in the ways I value the most	3.81			
Overall professional fulfilment		No	25 (156)	16%
		Yes	131 (156)	84%
Work exhaustion#	2.71			
During the past two weeks I have felt:				
A sense of dread when I think about work I have to do	2.54			
Physically exhausted at work	2.76			
Lacking in enthusiasm at work	2.70			
Emotionally exhausted at work	2.85			
Overall work exhausted		No	22 (156)	14%
		Yes	134 (156)	86%
Interpersonal disengagement#	2.23			
During the past two weeks my job has contributed to my feeling:				
Less empathetic with my patients	2.1			
Less empathetic with my colleagues	2.22			
Less sensitive to others' feelings/emotions	2.26			
Less interested in talking to my patients	2.15			
Less connected with my patients	2.24			
Overall interpersonally disengaged		No	37 (156)	24%
		Yes	119 (156)	76%
Burnout		No burnout	43 (156)	28%
		Burnout	113 (156)	72%

Categorical variables expressed with counts and percentages of total

*Professional fulfilment was scored on a scale of 0–4, where 0 is not true and 4 is entirely true

#Work exhaustion and interpersonal disengagement scored on a scale of 0–4, where 0 is not at all and 4 is very much

per month (62 of 155), and 77% (119 of 155) reported between zero and two weekend calls per month. A median of three times per week was reported for sports participation (IQR 1–4), and a median of five hours per week was spent on hobbies (IQR 3–10). Time spent sleeping both on call and off call were similar, with medians of six hours (IQR 4–7) and seven hours (IQR 6–7) reported, respectively. *Table II* summarises these findings.

Results of Stanford PFI

Table III represents the results of the Stanford PFI. Eighty-four per cent (131 of 156) of respondents were found to be professionally fulfilled (PF), scoring a median of 3.9 (IQR 3.3–4.5) for these six questions. Eighty-six per cent (134 of 156) scored 1.33 or more for the four questions assessing work exhaustion (WE), and 76% (119 of 156) scored 1.33 or more for the six interpersonal disengagement (ID) questions, with median scores of 2.8 (IQR 1.8–3.8) and 2.17 (IQR 1.3–3.0) respectively. Burnout was present in 72% (113 of 156) of respondents (combined average WE and ID scores 1.33 or greater).

Causes of burnout

Regarding causes of burnout, 'too many bureaucratic tasks' (70%; 107 of 153), 'lack of compensation' (41%; 63 of 153)

and 'government regulations' (40%; 61 of 153) were selected most frequently (*Figure 1*). For female respondents, additional contributors to burnout were commonly 'feeling of responsibility to others' (63%; 10 of 16), 'gender bias from colleagues' (56%; 9 of 16), and 'gender bias from patients' (50%; 8 of 16). Most people managed their burnout with exercise (68%; 105 of 155), hobbies (57%; 88 of 155) or taking leave (64%; 99 of 155) (*Figure 2*).

Workplace distress conditions

Of the screening questions for workplace distress conditions captured in *Table IV*, the most notable findings were that 84% of respondents (130 of 155) screened positive for moral injury, 71% (110 of 155) screened positive for at least one approval addiction question, and 93% (143 of 154) screened positive for at least one question about second victim syndrome. Two-thirds of respondents (104 of 155) screened positive for compassion fatigue.

Effect of burnout on respondents

Burnout had a large or severe effect on 24% (37 of 155) of respondents, moderate effect on 37% (58 of 155), and a small or minimal effect on 39% (60 of 155) of respondents, respectively. Burnout impacted relationships in 51% (79 of 154) of cases. Thirty-six per cent (56 of 155) of respondents said they would take a

Table IV: Screening questions and results for each of the five associated workplace distress conditions

	Count (n) %	Count (n) %
	No	Yes
Moral injury		
Have you found yourself in a position where you felt patient care was compromised due to failure of the healthcare system of South Africa?	25 (155) 16%	130 (155) 84%
Approval addiction	No	Yes
Is your happiness dependent on what others think of you?	86 (154) 56%	68 (154) 44%
Do you struggle to say 'NO'?	45 (155) 29%	110 (155) 71%
Compassion satisfaction & fatigue	No	Yes
Do you think you have ever felt fatigued by dealing with a patient who has experienced trauma?	51 (155) 33%	104 (155) 67%
Do you get satisfaction from being able to help patients?		156 (156) 100%
Imposter phenomenon	No	Yes
Have you ever been surprised by your successful completion of a task or received promotion and felt it was most likely as a consequence of luck or 'being in the right place at the right time'?	99 (152) 65%	53 (152) 35%
Do you find it hard to accept compliments or praise due to fear you will be 'found out' as a fraud or not as intelligent as you perceive people think you are?	109 (154) 71%	45 (154) 29%
Second victim syndrome	No	Yes
Have you felt physically or psychologically distressed by a negative patient outcome for which you felt responsible?	11 (154) 7%	143 (154) 93%
Has the experience from the previous question negatively affected your desire to work, attend work, or changed your perception of your abilities?	69 (143) 48%	74 (143) 52%

Categorical variables expressed with counts and percentages of total.

Table V: Univariate analysis of factors significantly associated with burnout

	Burnout	No burnout	p-value	OR	95% CI	Power
Demographics and call-related characteristics						
Qualification (n = 155) Ref: specialist			0.022	0.022	0.04–0.78	81%
Specialist	88/128 (69%)	40/128 (31%)				
Registrar	25/27 (93%)	2/27 (7%)				
Dependants (median, IQR)						
How old is the oldest child?	13 (8–24)	28 (16–31)	0.002	0.95	0.91–0.98	90%
How old is the youngest child?	8 (3–18)	23 (8–29)	< 0.001	0.94	0.90–0.97	95%
On-call hours of sleep	5 (2.14)	6.2 (1.49)	0.003	0.68	0.53–0.88	97%
Self-reported causes of burnout						
Hours at work	37/40 (92%)	3/40 (8%)	0.005	6.00	1.74–20.76	94%
Lack of free time	47/51 (92%)	4/51 (8%)	< 0.001	6.41	2.14–19.23	99%
Work–life imbalance	46/52 (88%)	6/52 (12%)	0.005	3.89	1.51–10.02	89%
Associated workplace syndromes						
Moral injury	101/130 (78%)	29/130 (22%)	0.003	3.77	1.55–9.16	81%
Compassion fatigue	113 (72%)	43/156 (28%)	< 0.001	4.59	2.17–9.71	99%
Impact and coping mechanisms of burnout						
Impact burnout on life (n = 155) Ref: 'no impact'			< 0.001	2.92	1.94–4.41	100%
No impact	8/29 (28%)	21/29 (72%)				
Little/minimal impact	21/31 (68%)	10/31 (32%)				
Moderate impact	50/58 (86%)	8/58 (14%)				
Large impact	26/29 (90%)	3/29 (10%)				
Severe impact	7/8 (87.5%)	1/8 (12.5%)				
Impact of burnout on relationships (n = 154) Ref: 'yes'			< 0.001	0.34	0.18–0.63	97%
Yes	69/79 (87%)	10/79 (13%)				
No	37/66 (56%)	29/66 (44%)				
Prefer not to answer	6/9 (67%)	3/9 (33%)				
Coping mechanisms						
Alcohol	39/44 (89%)	5/44 (11%)	0.008	3.90	1.42–10.72	85%

Categorical variables were expressed as frequencies and percentages. Continuous variables were expressed as medians and interquartile ratios. Relationships between variables and the primary binary outcome, burnout, are expressed as odds ratios and 95% confidence intervals. Significance level set at $p < 0.05$. Reference categories listed alongside category label.

OR: odds ratio; CI: confidence interval; Ref: reference

salary reduction to improve their work–life balance. Nine per cent (14 of 156) were on treatment for mood disorders and 10% (15 of 155) reported having experienced suicidal ideation. Eighteen per cent (28 of 155) had sought professional help for burnout or depression. Sixty-six per cent of respondents (101 of 154) reported their workplace did not have a mechanism to detect burnout, and 64% (99 of 156) reported their workplace did not have a programme to manage burnout. If burnout management programmes were available, most people had not attended them (80%; 16 of 20), and if programmes became available, 38% (58 of 153) reported it ‘unlikely’ that they would attend. Thirty-nine per cent (61 of 156) of respondents provided suggestions for improving burnout. Thirty per cent (18 of 61) suggested that system changes at the government and institutional level would reduce burnout most effectively. Improving communication, support and social relationships among

colleagues (20%; 12 of 61), improved staffing complement and staff efficacy (20%; 12 of 61), and reduced working hours (18%; 11 of 61) were other common suggestions.

Univariate analysis and multiple regression model

Table V provides a summary of the variables associated with burnout. Of the demographic and call-related characteristics, ‘age of youngest child’ ($p \leq 0.001$), ‘age of oldest child’ ($p = 0.002$) and on-call hours of sleep ($p = 0.003$), were inversely associated with burnout. That is to say; burnout was associated with respondents who had younger children and fewer hours of sleep on call. Burnout was associated with being a registrar ($p = 0.022$), with no association to the current year of training (Figure 3). There was no association between practice sector, gender, relationship status or workload. Of the self-reported causes of burnout,

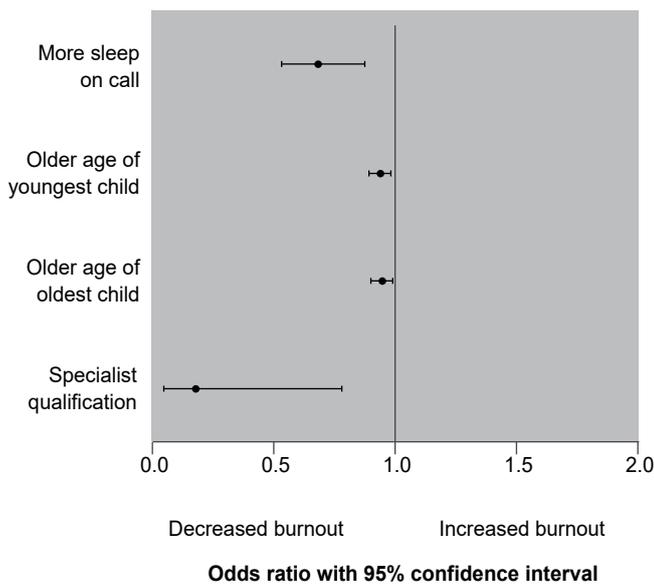


Figure 3. Univariate logistic regression analyses for demographic and call-related risk factors associated with objectively measured burnout. These relationships are presented as odds ratios and 95% confidence intervals. Univariate analyses are only presented for variables with post hoc power exceeding 80%.

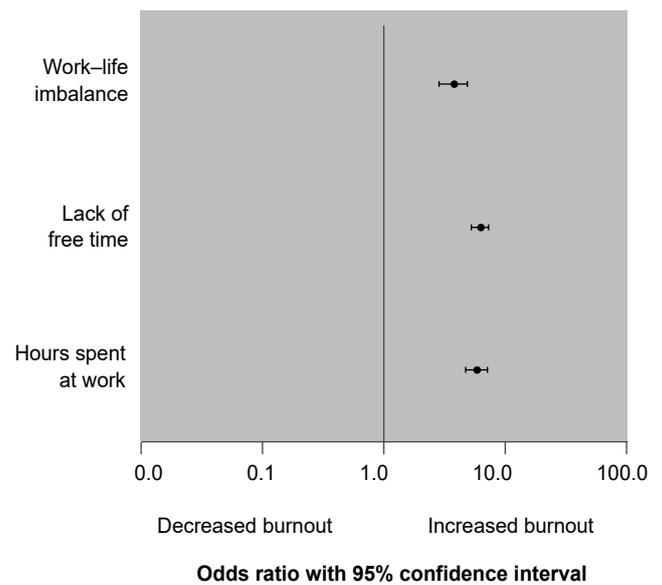


Figure 4. Univariate logistic regression analyses for self-reported causative factors and their association with objectively measured burnout. These relationships are presented as odds ratios and 95% confidence intervals. Univariate analyses are only presented for variables with post hoc power exceeding 80%.

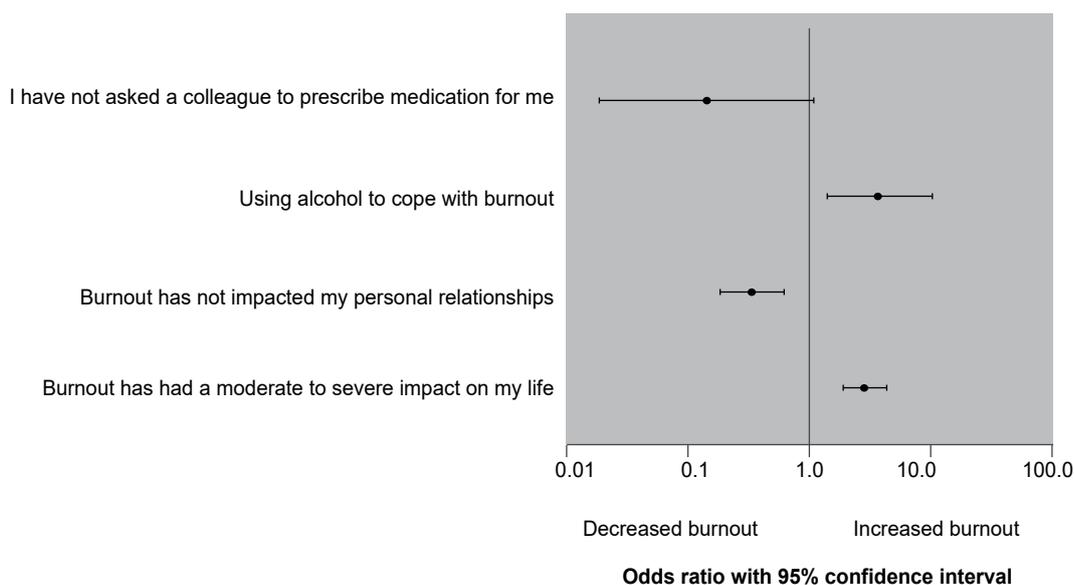


Figure 5. The above table represents univariate logistic regression analyses for behavioural changes as well as social changes and their association with objectively categorised burnout. These relationships are presented as odds ratios and 95% confidence intervals. Univariate analyses are only presented for variables with post hoc power exceeding 80%.

Table VI: Univariate analysis of COVID effects on survey responses

	Burnout	No burnout	p-value	OR	95% CI	Power
COVID effects on work–life characteristics						
Has COVID affected your sleep? (n = 146) Ref: 'no'			0.005	3.96	1.53–10.25	94%
Yes	62/94 (66%)	32/94 (34%)				
No	46/52 (88%)	6/52 (12%)				
How severe has the impact of COVID been on your sleep? (n = 52) Ref: 'minimal'			0.004	5.66	1.73–18.54	94%
Minimal effect	1/4 (25%)	3/4 (75%)				
Mild effect	6/7 (86%)	1/7 (14%)				
Moderate effect	20/22 (91%)	2/22 (9%)				
Severe effect	16/16 (100%)	0/16 (0%)				
Maximal effect	3/3 (100%)	0/3 (0%)				
Has the impact burnout has on your life been affected by COVID? (n = 155) Ref: 'yes, increased'			< 0.001	0.30	0.19–0.48	100%
Yes, increased the impact on my life	72/77 (94%)	5/77 (6%)				
Yes, decreased the impact on my life	6/11 (55%)	5/11 (45%)				
No, COVID has had no effect my experience of burnout	35/67 (52%)	32/67 (48%)				
Has COVID altered your selection of causes burnout? (n = 156) Ref: 'yes, more options'			< 0.001	0.37	0.22–0.64	100%
Yes, I have selected more options	44/47 (94%)	3/47 (6%)				
Yes, I have selected fewer options	12/17 (71%)	5/17 (29%)				
No	57/92 (62%)	35/92 (38%)				
The effect of COVID on my mood disorder (n = 152) Ref: 'yes, COVID has worsened'			0.022	0.29	0.10–0.84	99%
Yes, COVID has worsened my experience of mood disorder	22/22 (100%)	0/22 (0%)				
Yes, COVID has improved my experience of mood disorder	0/2 (0%)	2/2 (100%)				
No, COVID has no effect on the experience of my mood disorder	87/128 (68%)	41/128 (32%)				
COVID effects on Stanford PFI						
Has COVID affected your PF score? (n = 155) Ref: 'yes, closer to 4'			0.014	0.46	0.25–0.85	71%
Yes, more results closer to 4 (i.e. more professionally fulfilled)	11/17 (65%)	6/17 (35%)				
Yes, more results closer to 0 (i.e. less professionally fulfilled)	51/53 (96%)	2/53 (4%)				
No change	51/85 (60%)	34/85 (40%)				
Has COVID affected your WE score? (n = 155) Ref: 'yes, closer to 4'			< 0.001	0.27	0.16–0.46	100%
Yes, more results closer to 4 (i.e. more work exhaustion)	51/56 (91%)	5/56 (9%)				
Yes, more results closer to 0 (i.e. less work exhaustion)	30/34 (88%)	4/34 (12%)				
No change	32/65 (49%)	33/65 (51%)				
Has COVID affected your ID score? (n = 155) Ref: 'yes, closer to 4'			< 0.001	0.30	0.17–0.53	100%
Yes, more results closer to 4 (i.e. more interpersonally disengaged)	43/46 (93%)	3/46 (7%)				
Yes, more results closer to 0 (i.e. less interpersonally disengaged)	27/33 (82%)	6/33 (18%)				
No change	43/76 (57%)	33/76 (43%)				

Categorical variables were expressed as frequencies and percentages. Continuous variables were expressed as medians with interquartile ranges. Relationships between variables and the primary binary outcome, burnout, are expressed as odds ratios and 95% confidence intervals. Significance level set at $p < 0.05$. Reference categories listed alongside category label.

OR: odds ratio; CI: confidence interval; Ref: reference; PF: professionally fulfilled; WE: work exhaustion; ID: interpersonally disengaged

respondents that selected 'hours at work', 'lack of free time' and 'work–life imbalance' as causes of burnout, were more likely to have measured burnout (Figure 4). No coping mechanisms were found to be associated with reduced burnout, but if respondents selected 'alcohol' as a coping mechanism, they had an increased risk of burnout (Figure 5). Screening positive for moral injury or one measure of compassion fatigue, placed respondents at increased risk of burnout. Burnout was associated with the graded 'impact of burnout' measure (the greater the reported impact, the greater the risk of burnout), as well as to the reported impact on relationships.

The multiple regression model that best explained the presence

of burnout included the following factors: 'lack of free time', compassion fatigue, alcohol as a coping mechanism, 'impact of burnout on life', 'impact of burnout on relationships', age of children and on-call hours of sleep. Compassion fatigue, and the impact of burnout on relationships were found to be independently associated with burnout.

Impact of COVID on burnout

We found several associations between COVID and measured burnout (Table VI). Respondents who reported that COVID had affected their sleep, had an increased risk of burnout, with the

majority of respondents with burnout recording it had a moderate to maximal effect on their sleep. Selection of 'COVID has increased the impact of burnout on my life', 'I have selected more burnout causes' and 'COVID has worsened my experience of my mood disorder' were all positively associated with increased risk of burnout. Concerning the Stanford PFI objective burnout measure and COVID, in all three sub-categories, most respondents reported that COVID had moved all their scores closer to zero, in essence *decreasing* their burnout score. This was associated with a reduced risk of burnout for most respondents (*Table VI*).

Discussion

We found a burnout rate of 72% in South African orthopaedic surgeons and trainees, which falls on the higher end of the spectrum compared to international studies (between 16% and 85%).⁵

Numerous studies have identified several common associations with burnout and recognised groups within the health professions at higher risk of developing burnout.^{2,8,32} The majority of associations reported with burnout are health-system related or work environment issues such as: lack of autonomy, too many bureaucratic tasks, administrative responsibilities, high workload, remuneration, working hours and calls (correlated to sleep deprivation),^{2-4,8,10,11,14,15,33-36} The other causes pertain to work-life imbalance including: having dependants and inability to balance work and family responsibilities.^{2,5,7,11,32,36} Specific groups shown to be at greater risk for developing burnout comprise: physicians of younger age, female gender and trainees.^{2,5,14}

In our cohort, we found similar risk factors, such as having children of younger age and fewer on-call hours of sleep. Although most respondents reported that burnout was caused by 'lack of compensation' and 'bureaucratic tasks', the factors that placed them at increased risk were rather, 'hours at work', 'lack of free time' and 'work-life imbalance'. The significantly higher rate of burnout in registrars compared to specialists is consistent with findings from the USA and Australia.³⁷⁻⁴⁰ This is a concern for training coordinators, as among many implications, burnout has notably been shown to contribute to poorer examination results.⁴⁰ We found no association between gender and burnout in our study; however, the study was underpowered to detect a difference.

Physicians attending to cancer patients have been shown to have an increased risk of burnout, and in the orthopaedic context specifically, the highest rates of burnout were in arthroplasty surgeons in China (85%).^{10,41} Neither arthroplasty nor orthopaedic oncology were found to be associated with burnout in our study. Identifying as a paediatric subspecialist tended towards being protective against burnout but was underpowered to detect significance. This was an unanticipated finding. The Paediatric Orthopaedic Association of North America (POSNA) reports burnout of 38% among their members, while 28% (two of seven) of orthopaedic specialists in our cohort had burnout.¹⁶

Once burnout has been established, international reports show that it contributes to: higher rates of depression and suicidal ideation, broken relationships, increased alcohol and drug use, and reduced work satisfaction.^{7,8,10-13} Suicidal ideation rate (10%) in our cohort was similar to that of a USA Medscape study (13%) in which orthopaedic surgeons had the second highest rate across the specialities represented.¹⁴

Also from the Medscape report was the finding that 47% of workplaces do not have programmes to manage burnout, compared to 63% in our cohort.¹⁴ In addition, the Medscape respondents reported that even if workplace programmes to manage burnout did exist, 42% of them would be unlikely to attend it, similar to 38% reporting this in our cohort. The Medscape respondents reported 'fear of stigma in the workplace', or felt the condition was

not 'severe' enough to warrant attendance at such a programme as reasons for unlikely attendance. Irrespective, participation in wellness programmes has only minimally improved burnout scores; likewise, resilience training studies reflect conflicting results.^{7,12,33} We feel that this is because the main causal agent is at the system or organisation level, rather than as a result of an individual's behaviours. One of our respondents put it eloquently: 'The likelihood that I would participate in any burnout program would depend on whether I perceive the program to be useful. Viewing burnout as something that can be addressed at the individual level is pointless. It does not help to tell someone to exercise or meditate or something when they are being traumatised by an external system that doesn't allow time for those things anyway.' This emphasises our finding that no self-reported coping mechanisms were found to be protective against burnout. In addition, it echoes the current research direction, which has shifted focus toward changes that need to occur at a system or organisational level, such as administrative support, reduced working hours, supportive mentorship and advocacy for member support in medical societies, which hold promise.^{4,10,11,14}

With the advent of COVID-19, the South African health system has seen an increase in burnout due to increased demand for already strained resources.⁴² Fear of contracting the virus, fear of infecting family members, and reduced staffing have also been contributory.⁴³ Younger doctors, female doctors and trainees remain at higher risk of burnout during the pandemic.⁴⁴⁻⁴⁶ Interestingly, there are conflicting reports of burnout rates in healthcare workers that are in direct contact with COVID-positive patients. Some studies report reduced burnout rates or no difference in burnout rates.^{47,48} Those who have lower burnout rates than their colleagues may be benefiting from 'a return of a sense of autonomy', or 'the ability to display altruism', or 'the ability to relate to their patients', argue Hartzband and Groopman.³⁵

We explored the possible confounding nature of the COVID pandemic on our findings. Consistent with Medscape's National (US) Physician burnout reports from successive years (2019–2021), where orthopaedic surgeon burnout decreased after the onset of COVID (from 38% in 2019 to 34% and 33% in 2020 and 2021 respectively), respondents in our study indicated that their selections on the measured burnout index were typically reduced since the advent of the pandemic. It bears mentioning that these responses are subject to recall bias. However, should this result be an accurate reflection of burnout during this time, we surmise that the majority representation of orthopaedic specialists, private sector practitioners, had a reduced workload due to elective surgery restrictions, and that could have contributed to this finding.

In addition to this bias, there were other limitations. A priori sample size estimates for the regression model we utilised would have necessitated a 27% response rate; however, our response rate was 16%. Although this was comparable to previous studies in orthopaedic cohorts (the majority of which quote rates around 20%, but range from 6–94%), it meant that our study was underpowered to detect significance for several variables.⁵ Burnout studies regularly experience poor response rates. It is likely this reflects a lack of time to complete extensive questionnaires with minimal incentive, which we believe to be true in our context.⁵

In our questionnaire, we used the Stanford PFI Measure. While it is a validated burnout measurement scale, it limited comparison to only those studies that used this measure or those that reported an overall burnout score. We deemed this acceptable, however, as overall burnout was our outcome of interest. Furthermore, the information sheet and consent form detailed that the survey aimed to evaluate the presence of burnout in orthopaedic surgeons. This could have introduced response bias and exhibited a priming effect on results. However, some of the questions explicitly asked about

'burnout', and as such, the investigators felt this effect would have occurred despite blinding respondents.

Respondents were blinded to the fact that we screened for other associated workplace distress conditions, for which we found high rates in all five conditions. This uncovered a knowledge dearth that warrants further investigation. Other gaps we did not explore in this study include whether burnout rates differ between provinces within South Africa, or across rural and urban boundaries, findings which have been detected in previous burnout investigations both in South Africa and abroad.^{6,19,22,49,50}

Conclusion

Burnout is prevalent in the South African orthopaedic community (72%). Registrars are particularly vulnerable, and further investigation is necessary to identify risk factors particular to this group. Modifiable system-based risk factors, and thus potential targets for initiatives to reduce the burnout rate, included: 'hours at work' and 'lack of free time'. High rates of positive screening for associated workplace distress conditions warrants further investigation.

Additional information

Should you, after reading this article, recognise the symptoms of burnout in yourself and desire support, psychological assistance is available to you by contacting the Healthcare Workers Care Network helpline at 0800 21 21 21.

Alternatively, the South African Orthopaedic Association has initiated a Mentorship Programme, available to all members of the SAOA. To get in touch, please email info@saoa.org.za.

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Ethics statement

The authors declare that this submission is in accordance with the principles laid down by the Responsible Research Publication Position Statements as developed at the 2nd World Conference on Research Integrity in Singapore, 2010.

The study complied with the South African Department of Health ethics guidelines (2015), and the University of KwaZulu-Natal policy on research ethics. Prior to commencement of this research, the appropriate ethical approval was obtained from the Biomedical Research Ethics Committee of UKZN (BREC/00002150/2020).

Declaration

The authors declare authorship of this article and that they have followed sound scientific research practice. This research is original and does not transgress plagiarism policies.

Author contributions

MO: protocol revision, data capture, data analysis, first draft preparation, manuscript revision

NF: protocol revision, initial design of data capture tool, draft manuscript review and revision

MS: data analysis and critical review of manuscript draft and revisions for statistical method, preparation of statistical figures

PW: SAOA support of research initiative, review of data capture tool, draft manuscript and revision review

RGV: protocol revision, draft manuscript and revision review

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