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## Triggering and protective factors of burnout in medical resident physicians in a lower-middle-income country: A cross-sectional study

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## Cross-sectional Study

# Triggering and protective factors of burnout in medical resident physicians in a lower-middle-income country: A cross-sectional study

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## ABSTRACT

**Background:** Residents and interns are prone to emotional and physical exhaustion, also known as burnout. Burnout has not been studied much in physicians working in lower-middle income countries. We conducted this study to determine the burden of burnout among internal medicine residents and to identify triggering and protective factors associated with burnout.

**Materials and methods:** A cross-sectional study was conducted at two institutes in Karachi from 2018 to 2019. All residents registered in the internal medicine program for at least 6 months were invited to participate via an online survey. An abbreviated version of the Maslach Burnout scale was used to measure burnout, and protective and triggering factors were recorded according to known factors.

**Results:** A total of 71 out of 92 (77%) residents participated. The mean (SD) age of the participants was 28 (3.1) years, 51 (71.8%) were females and 51 (71.8%) were junior residents. A total of 33 (46.5%) residents had burnout. Burnout and emotional exhaustion were more in female residents ( $p < 0.05$ ). None of the triggering factors attained statistical significance. The protective factors for burnout which showed significant association were good relationship with friends (OR 0.1–95% CI 0.0, 0.6), exercise and extra-curricular activities (OR 0.2–95% CI 0.0, 0.7), celebrating accomplishments (OR 0.2–95% CI 0.0, 0.7), having enough money (OR 0.2–95% CI 0.0, 0.4), and ability to plan for future (OR 0.1–95% CI 0.0, 0.6).

**Conclusion:** More than a third of medicine residents suffered from burnout. We need to focus on rejuvenating activities for medicine residents to decrease burnout among them. If not addressed adequately this may result in a compromise in the quality of care being provided to patients.

## 1. Introduction

The word ‘burnout’ was initially devised in 1974 by psychologist Herbert Freudenberger while discussing job satisfaction concerning work-related stress [1]. It is defined as a state of mental and physical exhaustion while performing work or caregiving activities. Maslach in 1993 further elaborated and categorized it as a troika of emotional exhaustion, depersonalization, and reduced personal accomplishment [2]. Over the years, the concept of burnout has gained quite a bit of popularity in the field of healthcare as the tough working environment and the intense schedule predispose clinicians to develop a significant degree of burnout [3]. However, studies on burnout on health care

professionals from lower-middle-income countries focusing on its triggering and relieving factors are lacking [4].

Most physicians affected by burnout include either residents or interns as their training period involves quite a lot of interaction with different colleagues as well as complex decision-making and diagnostic dilemmas [1]. As per literature, approximately 50% of physicians are suffering from at least one symptom of burnout worldwide [3]. Burnout is associated with several negative and deleterious effects for the physician and the healthcare system. These can be varied in terms of decreased productivity and decreased job satisfaction and can even lead to severe depression for the physicians. Consequently, this can lead to poor patient care, increased length of stay, and major medical errors [5].

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Accreditation Council for Graduate Medical Education (ACGME) had recognized these epidemic levels of burnout and introduced the work-hour limit and directed the program directors to restructure the program for resident wellness [3]. Interestingly, there is no clear, well demarcated mechanism for monitoring working hours of trainee physicians in Pakistan and unlike the United States, shift duties are less prevalent in most postgraduate programs. Numerous scales have been employed in identifying the level of burnout among physicians among which the Maslach burnout scale is the gold standard for assessment of burnout. It has been commonly used in many studies and evaluates burnout in terms of emotional exhaustion, depersonalization, and personal accomplishment [6]. However, the original Maslach burnout scale is quite long making it difficult to use. The Copenhagen Burnout inventory is another scale that assesses burnout based on questions related to three main domains including personal burnout, work-related burnout, and client/patient-related burnout. It is simpler and easy to comprehend by the respondents [7]. The gold standard so far for measurement of burnout is still the Maslach burnout scale and the abbreviated version (nine items form) is good enough to be used [8].

The factors driving a physician towards burnout are numerous and differ based on the department of work, the level of seniority, the sociocultural background, and the gender of the physician among many other factors. However, factors like working hours, financial support, lack of home life, time balance, and lack of autonomy are common in most studies [5,9,10].

Pakistan is a lower-middle-income country where there is no mechanism to monitor the work hours of residents or interns through any national-level licensing body, for example, the Pakistan Medical Commission. Hence, burnout in such countries often remains unnoticed [11]. Even though burnout has been extensively studied globally in the past five years' data from our country is lacking especially for internal medicine. A review of literature has shown two recent studies published: one concerning various specialty [12] while the other focusing on gynecologists [13]. Considering the above discussion, burnout is not only prevalent but also has serious consequences. More importantly, most of the data reported on burnout is from high income countries and surgical residency programs, while studies on internal medicine are a decade old [14]. Internal medicine residents deal with the most complex medical patients who are most likely to code, thus they are more likely to suffer from burnout [15]. Hence, we need to explore the magnitude of burnout and the various factors that drive physicians into it. It might be more of a problem in our setting due to relatively different and labile living conditions. Therefore, we designed this study to determine the prevalence of burnout among internal medicine residents at two tertiary care hospitals in Karachi. Secondly, we want to determine the association of various triggering and protective factors associated with burnout in resident physicians from training centers from a lower-middle-income country.

## 2. Materials and methods

### 2.1. Study design

This was a cross-sectional study conducted among internal medicine residents of two private academic institutions in Karachi – Pakistan; Aga Khan University and Ziauddin University in 2018–2019. Both institutions are private tertiary hospitals but with different academic and service models. All residents of the internal medicine program at both institutes were invited to participate in the study via an online survey through google forms. Residents who were part of a flexible training program, working in shifts and those who had done less than six months of training were excluded. Participation in the study was completely voluntary and the data was anonymized through coding and kept confidential.

### 2.2. Data collection

The resident survey measured burnout using the Maslach Burnout Inventory (MBI). The MBI is a 22-item questionnaire and is a gold standard for measuring burnout and is known to be stable for up to a year [16]. However, we used the abbreviated version which is designed to ask respondents to rate the frequency of various experiences on a 7-point Likert scale ranging from never to daily [17]. The scores were measured across three domains: emotional exhaustion, depersonalization, and personal accomplishment. Scores of more than nine and six on emotional exhaustion or depersonalization respectively while a score of less than 12 for personal accomplishment was taken for burnout. Review articles have shown that the abbreviated version of MBI is good enough for estimating burnout [8]. A person was considered to have a burnout if at least two out of three subscales have abnormal scores i.e., emotional exhaustion or depersonalization are high, or lack of personal accomplishment is low. Though MBI is commonly used to measure burnout in resident physicians, some variability exists in interpreting MBI scores [18,19]. The survey also included the triggering and protective factors which were scored on a five-item Likert scale (1 = Does not apply 2 = minimally applies 3 = neutral 4 = moderately applies 5 = strongly applies). Demographic variables like age, gender, marital status, PGY level, accommodation status, and commute methods were also recorded. The study is compliant with the STROCSS criteria limited to cross-sectional study [20] (checklist attached separately).

### 2.3. Data analysis

All analysis was done via SPSS 22.0. Chi-square/Fisher exact test applied to determine the association between burnout and categorical variables and *t*-test to compare quantitative variables. A *P* value of less than 0.05 has been taken as significant. Logistic regression modeling performed, and odds ratio were calculated to find an association between various triggering and protective factors with burnout.

### 2.4. Ethical considerations

Approval from the ethical review committee of both institutes was obtained before the start of the study (ERC No. 5135\_Med ERC-17 from Ethical review committee, Aga Khan University and Ref No.0140318UGMED from Ethical review committee, Ziauddin University). The research has been appropriately registered at [Clinicaltrials.gov](https://www.clinicaltrials.gov) (NCT04864002) [21].

## 3. Results

### 3.1. Demographics

A total of 92 residents were invited from both institutes to participate in the study. 71 responded to the online survey, giving a response rate of 77%. 54 (76%) were from Aga Khan University. Mean age was 28.3±3.1, 51 (71.8%) were female residents, 29 (40.8%) were married, 51 (71.8%) were of Level 1 and Level 2 in residency. [Table 1](#) summarizes the demographics characteristics of burnout.

### 3.2. Burnout

Thirty three (46.5%) residents were found to have burnout. Subdomains in the Maslach burnout inventory are summarized in [Table 2](#) about gender. Females were more significantly found to have emotional exhaustion (24 females to 4 males;  $p < 0.05$ ) and burnout (28 females to 5 males;  $p < 0.05$ ). After stratification of data according to the level of residency, burnout prevalence decreased with the increase in experience with 24.3% in year 2, 10% in year 3, and 8.6% in year 4 and 5. On subgroup analysis Level 2 physicians had higher burnout compared to the other levels of residency. Residents who had to use family cars were

**Table 1**  
Demographics and residency level of residents overall, with burnout without burnout.

	Overall	Burnout		P-value
	N (%)	Yes N (%)	No N (%)	
Mean (SD) Age	28.3 (3.1)	28.13 (3.2)	28.50 (3.0)	
Female Gender	51(71.8)	28(84)	24(63.2)	0.03
Residency level				
Level 1	21(29.6)	13(40.6)	8(21.1)	0.22
Level 2	30(42.3)	13(49.6)	17(44.7)	
Level 3	9(12.7)	2(6.3)	7(18.4)	
Level 4-5	10(14.1)	4(12.5)	6(15.8)	
Married	29(40.8)	15 (45.5)	14(36.8)	0.31
Accommodation status (residence)				
Without family	21(29.6)	10(30.3)	11(28.9)	0.55
Primary hometown outside Karachi	29(40.8)	10(30.3)	19(50.0)	0.15
Financial dependence	24(33.8)	10(30.3)	14(36.8)	0.37
More than 3 dependents	11(15.5)	4(12.1)	7(18.4)	0.75
Means of commute				
Personal bike or car	25(35.2)	7(21.2)	18(47.3)	0.05
Public transport	21(29.6)	10(30.3)	11(28.9)	
Family car	14(19.7)	11(33.3)	3(7.9)	
On foot commute	11(15.5)	5(15.2)	6(15.8)	

**Table 2**  
Burnout in residents (overall, male, female).

	Overall	Male N = 19	Female N = 52	P value
Emotional exhaustion (EE > 9)	28 (39.4)	4(21.1)	24 (46.2)	0.04
Depersonalization (Deper>6)	17 (23.9)	4(21.1)	13 (25.0)	0.49
Lack of Personal accomplishment (Lack of PA <12)	69 (97.2)	18 (94.7)	51 (98.1)	0.46
Burnout	33 (46.5)	5(26.3)	28 (53.8)	0.03

found to have burnout although statistical significance was not seen (33.3%–7.9%; *p-value* 0.052).

### 3.3. Triggering and protective factors for burnout

The odds ratio was calculated to find the association between various triggering factors and burnout. No triggering factor was found to be statistically significant to cause burnout. However, few triggering factors showed a borderline association for burnout; conflicting responsibility between home and work (OR 1.3–95% CI 0.5, 3.5), guilt about not having enough time for family (OR 1.4–95% CI 0.5, 3.7), scheduling problem (OR 1.2–95% CI 0.5, 3.2), training issues (OR 1.2–95% CI 0.4, 3.3), childcare arrangements (OR 1.4–95% CI 0.4, 4.4). Other factors studied are mentioned in [Table 3](#).

Factors that were protective towards getting burnout in internal medicine residents were, good relationship with friends (OR 0.1–95% CI 0.0, 0.6), exercise (OR 0.2–95% CI 0.0, 0.7), get-together with residents (OR 0.2–95% CI 0.1, 0.7), extra-curricular activities (OR 0.2–95% CI 0.0, 0.7), celebrating accomplishments (OR 0.2–95% CI 0.0, 0.7), supportive work environment (OR 0.3–95% CI 0.1, 0.9), having enough money (OR 0.2–95% CI 0.0, 0.4), and ability to plan for future (OR 0.1–95% CI 0.0, 0.6). Other factors studied are mentioned in [Table 4](#).

## 4. Discussion

Our study is the first from Pakistan which has involved internal medicine residents from two tertiary care hospitals and academic

**Table 3**  
OR triggering factors for burnout.

Factors	Burnout N (%)	No burnout N (%)	OR (95% CI)
Conflicting responsibility between home family and work	20(60.6)	20(52.6)	1.3 (0.5,3.5)
Difficult and complicated patients	8(24.2)	17(44.7)	0.3 (0.1,1.0)
Excessive paperwork	21(63.6)	28(73.7)	0.6 (0.2,1.7)
Guilt about never having enough time for family	24(72.7)	32(84.2)	0.5 (0.1,1.5)
Guilt about never having enough time for work	14(42.4)	13(34.2)	1.4 (0.5,3.7)
Difficulty staying organized	10(30.3)	13(34.2)	0.8 (0.3,2.2)
Difficulty staying on schedule	14(42.4)	14(36.8)	1.2 (0.4,3.2)
Too many work demands	23(69.7)	30(78.9)	0.6 (0.2,1.8)
Not enough time in the day	21(63.6)	32(84.2)	0.3 (0.1,1.0)
Depressed mood	12(36.4)	18(47.4)	0.6 (0.2,1.6)
Anxiety	12(36.4)	22(57.9)	0.4 (0.1,1.0)
Lack of sleep	22(66.7)	29(76.3)	0.6 (0.2,1.7)
Regret over chosen career	4(12.1)	5(13.2)	0.9 (0.2,3.7)
Lack of control over office y	9(27.3)	10(26.3)	1.0 (0.3,3.0)
Lack of control over my training	12(36.4)	12(31.6)	1.2 (0.4,3.3)
Poor control over my training	11(33.3)	13(34.2)	0.9 (0.3,2.5)
Poor relationships with colleagues	3(9.1)	4(10.5)	0.8 (0.1,4.1)
Family conflicts	1(3.0)	3(7.9)	0.3 (0.0,3.6)
Worry over childcare arrangements	8(24.2)	7(18.4)	1.4 (0.4,4.4)
Lack of control over schedule	14(42.4)	12(31.6)	1.5 (0.6,4.2)
Lack of time to exercise, take care of myself, and do things I enjoy	25(75.8)	29(76.3)	0.9 (0.3,2.8)
Boredom in my job	11(33.3)	12(31.6)	1.0 (0.4,2.9)
Lack of resources in my job	9(27.3)	15(39.5)	0.5 (0.2,1.5)
Lack of coping skills for stress	12(36.4)	14(36.8)	0.9 (0.3,2.5)
Being a perfectionist	9(27.3)	14(36.8)	0.6 (0.2,1.7)
Being a pessimist	3(9.1)	8(21.1)	0.3 (0.0,1.5)
Lack of recognition of my accomplishments	9(27.3)	15(39.5)	0.5 (0.2,1.5)
Not having enough money	16(48.5)	22(57.9)	0.6 (0.2,1.7)
Lack of control over hospital processes	16(48.5)	21(55.3)	0.7 (0.2,1.9)

centers and looks at the triggering and protective factors of burnout. The study uses a validated tool for measuring burnout and highlights the triggering and protective factors and is one of the first studies to be conducted on internal medicine residents at two different universities in this region.

Our study reports an estimated burnout prevalence of 46.5% among the resident physician of the two academic centers. It also highlights the fact that a lack of protective factors might play a stronger role in burnout rather than the presence of triggering factors. Some of the protective factors that help reducing burnout in residents' physicians are having good support of friends at work, the ability to spend time out with friends, having enough money, and able to celebrate the

**Table 4**  
OR Protective factors for burnout.

Factors	Burnout N (%)	No burnout N (%)	OR( 95 % CI)
Having good family relationships	26(78.8)	35(92.1)	0.3 (0.0,1.3)
Having good relationships with friends	20(60.6)	34(89.5)	0.1 (0.0,0.6)
Spiritual belief	22(66.7)	27(71.1)	0.8 (0.2,2.2)
Exercise	7(21.2)	19(50.0)	0.2 (0.0,0.7)
Getting together with other residents	10(30.3)	23(60.5)	0.2 (0.1,0.7)
Talking together with faculty or physician mentor	12(36.4)	18(47.4)	0.6 (0.2,1.6)
Prescription Medicines	4(12.1)	4(10.5)	1.1 (0.2,5.1)
Talking about my feelings	10(30.3)	13(34.2)	0.8 (0.3,2.2)
Professional counseling	11(33.3)	8(21.1)	1.8 (0.6,5.4)
Making time for activities I enjoy	16(48.5)	30(78.9)	0.2 (0.0,0.7)
Saying no when I need to say no	11(33.3)	24(63.2)	0.2 (0.1,0.7)
Feeling like having a say in my residency program	12(36.4)	15(39.5)	0.8 (0.3,2.2)
Feeling contended and compassionate about my patients	12(36.4)	17(44.7)	0.7 (0.2,1.8)
Celebrating my accomplishments	12(36.4)	26(68.4)	0.2 (0.0,0.7)
Feeling like I have some control over my schedule	13(39.4)	22(57.9)	0.4 (0.1,1.2)
Good coping skills	14(42.4)	21(55.3)	0.5 (0.2,1.5)
Good time management skills	14(42.4)	23(60.5)	0.4 (0.1,1.2)
Being an optimist	15(45.5)	17(44.7)	1.0 (0.4,2.6)
Being happy with childcare arrangements	8(24.2)	8(21.1)	1.2 (0.3,3.6)
Getting enough sleep	16(48.5)	26(68.4)	0.4 (0.1,1.1)
Having good working relationships?	17(51.5)	26(68.4)	0.4 (0.1,1.2)
Having supportive work environment	15(45.5)	27(71.1)	0.3 (0.1,0.9)
Having a plan for my future	12(36.4)	29(76.3)	0.1 (0.0,0.4)
Having enough money	11(33.3)	26(68.4)	0.2 (0.0,0.6)

accomplishment. The study reports borderline triggers for burnout including conflicting responsibility between home and work, guilt about not having enough time for work, lack of control on scheduling, training issues, and childcare arrangements.

A systemic review and meta-analysis of 47 articles done in 2019 showed an overall burnout of 51% with high preponderance in Asian countries [14]. However, internal medicine residents showed an even higher percentage of burnout up to 57.1%. The study included 16 studies related to internal medicine. However, the results of this meta-analysis were limited by the fact that no studies were looking at Internal medicine residents from an Asian country. Another study involving 26 articles done in 2019 showed burnout in internal medicine residents around 33.1% [22]. The study also showed that internal medicine residents had the lowest personal accomplishment values. Our study shows burnout of 46% which is similar to what has been reported in these meta-analyses, however, our study is primarily conducted in a lower-middle-income country focusing on Internal medicine residents in two academic setups.

These meta-analyses reported no statistical difference in burnout between male and female residents suffering from burnout [14,22]. However, two studies have reported that burnout and depersonalization

are more likely to occur in men rather than women [23,24]. Similarly, two studies have reported that burnout is more prevalent in females, though one study did have an over-representation of females [25,26]. Our study has shown a female preponderance in burnout and emotional exhaustion. This finding is in line with previous studies. It is also quite consistent with the overall social and cultural norm in a South Asian country like Pakistan, where most of the responsibility of the household lies on the women and this becomes more challenging in the case of working women [27,28]. Hence a woman who takes care of household responsibilities and works in a hospital taking care of patients while meeting her training needs is liable to get burnt out easily.

Duty hours and the monthly number of calls are strongly associated with burnout in a group of residents [29]. Campbell et al. reported similar findings in their study where emotional exhaustion and burnout decreased through the three years of residency. Nonetheless, there was no significant change in scores of depersonalization and personal accomplishment [23]. Almost all studies have shown that the prevalence of burnout decreases with increased experience. Our study also showed the same results, with subgroup analysis showing that level 2 physicians had higher burnout compared to the other levels of residency. However, there was no statistical significance. The major reason behind this is the change in duty hours and the increase in clinical acumen to make the required diagnostic decisions. A better understanding of this can be achieved by performing a longitudinal study and following the same residents for three to four years who were inducted in the first year of residency.

A literature review has identified some major factors behind increased burnout. These triggers include poor working conditions with long work shifts, stressful call duties, lack of appreciation, and poor social interactions [3]. These factors have also been stressed by Har-iharan et al. in their review that work-specific and person-specific demands are the major factors behind burnout [9]. Solms et al. also reported that increased workload, work-family conflict, and lack of autonomy predispose residents to develop burnout [25]. The major triggering factors identified in our study with borderline significance is conflict between home and work and difficulty in staying on schedule. Our study highlights that burnout is triggered by conflicting responsibility and training-related factors. The responsibilities at home due to the joint family system or child care arrangement are more in the physician population from low and lower-middle-income countries of South Asian background as compared to high-income countries [30]. There is a possibility that rapid urbanization is gradually impairing the social support system at homes [31]. This needs further research as on one hand strong social support from joint family might help residents to concentrate on their training while on the other hand, the same support can also negatively impact the resident by imposing additional household demands.

Studies have also shown the impact of protective factors in reducing burnout. Availability of personal resources, good colleague support, and having psychological flexibility greatly helps in the prevention of burnout [9,25]. Olson et al. has emphasized the importance of exercise and physical activity by mentioning that increased body mass index was associated with higher odds of burnout. However, he did not find any significance in the protective effect of supportive relationships [32]. Our study also underlines the significance of good family and friend support, a supportive working environment, and physical activity to prevent burnout. We also think that friendship in our part of the world is more likely to be of the same gender. Our study also highlights the importance of residents get together and the significance of celebrating and getting acknowledged for accomplishments.

We need to focus on enhancing these protective factors for burnout among medicine residents. Emphasis should be made on factors that showed significance in protecting residents from burn out and ways to incorporate them in training should be sought to decrease burnout among residents. Programs should also try and measure grit scores early in residency, as they can potentially identify residents at risk for

symptoms of burnout, specifically emotional exhaustion, and implement targeted interventions [33].

#### 4.1. Limitations

The study does have some limitations. Firstly, the results cannot be generalized to public sector universities. Secondly, burnout was measured at one point in time and being post-call while filling the data might have negatively impacted the results. Recall bias also came into place as data collection involved resident's self-reports instead of defined clinical diagnosis and objective methods. It is also possible that many residents affected by burnout did not participate in the survey and conversely those least affected also avoided participating believing it a futile activity leading to selection bias. Finally, the cross-sectional study design is limited by its inability to consider the variability of symptoms over time.

#### 5. Conclusion

Almost a third of medicine residents were burnt out. While the triggering factors for burnout did not reach a clear level of significance, the protective factors for burnout were mainly linked to having supportive relations, work environment, and career and financial stability. The findings of our study can also be generalized to other tertiary hospitals in low and middle-income countries.

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#### Provenance and peer review

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#### Ethical approval

Approval from the ethical review committee of both institutes was obtained before the start of the study (ERC No. 5135\_Med ERC-17 from Ethical review committee, Aga Khan University and Ref No.0140318UGMED from Ethical review committee, Ziauddin University).

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#### Author contribution

Saad Bin Zafar Mahmood planned methodology, completed draft and final writing. Aqusa Zahid conducted survey and did draft writing. Noreen Nasir planned methodology and did draft writing. Munaim Tahir conducted survey. Uzma Ghouri conceptualized the project and did survey. Aysha Almas conceptualized the project, reviewed the final writing and supervised.

#### Registration of research studies

Name of the registry: [ClinicalTrials.gov](https://clinicaltrials.gov)  
 nique Identifying number or registration ID: NCT04864002.  
 Hyperlink to your specific registration (must be publicly accessible and will be checked):  
<https://clinicaltrials.gov/ct2/show/NCT04864002>.

#### Guarantor

Ethical Review Committee of the Aga Khan University Hospital.

Corresponding Author: Dr Aysha Almas.

#### Consent

Voluntary consent was taken for all participants when filling the online survey.

#### Declaration of competing interest

The authors have no conflict of interests or funding sources to report.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2021.102500>.

#### References

- [1] W.W. Ishak, S. Lederer, C. Mandili, R. Nikravesh, L. Seligman, M. Vasa, D. Ogunyemi, C.A. Bernstein, Burnout during residency training: a literature review, *J. Grad. Med. Educ.* 1 (2009) 236–242, <https://doi.org/10.4300/JGME-D-09-00054.1>.
- [2] C. Maslach, Burnout: a multidimensional perspective, in: *Prof. Burn. Recent Dev. Theory Res.*, 1993, pp. 19–32, <https://doi.org/10.4324/9781315227979-3>.
- [3] R.S. Patel, S. Sekhri, N.N. Bhimanadham, S. Imran, S. Hossain, A review on strategies to manage physician burnout, *Cureus* 11 (2019), e4805, <https://doi.org/10.7759/cureus.4805>.
- [4] S. Dugani, H. Afari, L.R. Hirschhorn, H. Ratcliffe, J. Veillard, G. Martin, G. Lagomarsino, L. Basu, A. Bitton, Prevalence and factors associated with burnout among frontline primary health care providers in low- and middle-income countries: a systematic review, *Gates Open Res* 2 (2018) 4, <https://doi.org/10.12688/gatesopenres.12779.3>.
- [5] H. Elmariah, S. Thomas, J.C. Boggan, A. Zaas, J. Bae, The burden of burnout, *Am. J. Med. Qual. Off. J. Am. Coll. Med. Qual.* 32 (2017) 156–162, <https://doi.org/10.1177/1062860615625802>.
- [6] C. Maslach, W.B. Schaufeli, M.P. Leiter, Job burnout, *Annu. Rev. Psychol.* 52 (2001) 397–422, <https://doi.org/10.1146/annurev.psych.52.1.397>.
- [7] T.S. Kristensen, M. Borritz, E. Villadsen, K.B. Christensen, The Copenhagen Burnout Inventory: a new tool for the assessment of burnout, *Work. Stress* 19 (2005) 192–207, <https://doi.org/10.1080/02678370500297720>.
- [8] K. Doulougeri, K. Georganta, A. Montgomery, "Diagnosing" burnout among healthcare professionals: can we find consensus? *Cogent Med* 3 (2016) <https://doi.org/10.1080/2331205X.2016.1237605>.
- [9] T.S. Hariharan, B. Griffin, A review of the factors related to burnout at the early-career stage of medicine, *Med. Teach.* 41 (2019) 1380–1391, <https://doi.org/10.1080/0142159X.2019.1641189>.
- [10] D. Mendelsohn, I. Despot, P.A. Gooderham, A. Singhal, G.J. Redekop, B.D. Toyota, Impact of work hours and sleep on well-being and burnout for physicians-in-training: the Resident Activity Tracker Evaluation Study, *Med. Educ.* 53 (2019) 306–315, <https://doi.org/10.1111/medu.13757>.
- [11] D.Y. Aksoy, M. Durusu Tanriover, S. Unal, O. Dizdar, U. Kalyoncu, J. Karakaya, S. Unal, G. Kale, Burnout syndrome during residency in internal medicine and pediatrics in a country without working time directive, *Int. J. Health Care Qual. Assur.* 27 (2014) 223–230, <https://doi.org/10.1108/IJHCQA-12-2012-0127>.
- [12] A.J. Zubairi, S. Noordin, Factors associated with burnout among residents in a developing country, *Ann. Med. Surg.* 6 (2016) 60–63, <https://doi.org/10.1016/j.amsu.2016.01.090>.
- [13] K. Waheed, N. Liaqat, A. Khanum, S. Ejaz, S. Ijaz, A. Butt, F.A. Randhawa, I. Naheed, S. Javed, Burnout among gynaecological residents in Lahore, Pakistan: a cross-sectional survey, *J. Pakistan Med. Assoc.* 67 (2017) 1318–1322.
- [14] Z.X. Low, K.A. Yeo, V.K. Sharma, G.K. Leung, R.S. McIntyre, A. Guerrero, B. Lu, C. C. Sin Fai Lam, B.X. Tran, L.H. Nguyen, C.S. Ho, W.W. Tam, R.C. Ho, Prevalence of burnout in medical and surgical residents: a meta-analysis, *Int. J. Environ. Res. Publ. Health* 16 (2019), <https://doi.org/10.3390/ijerph16091479>.
- [15] R. Nardi, G. Scanelli, S. Corrao, I. Iori, G. Mathieu, R. Cataldi Amatrian, Comorbidity does not reflect complexity in internal medicine patients, *Eur. J. Intern. Med.* 18 (2007), <https://doi.org/10.1016/j.ejim.2007.05.002>.
- [16] J.P. Lafreniere, R. Rios, H. Packer, S. Ghazarian, S.M. Wright, R.B. Levine, Burned out at the bedside: patient perceptions of physician burnout in an internal medicine resident continuity clinic, *J. Gen. Intern. Med.* 31 (2016) 203–208, <https://doi.org/10.1007/s11606-015-3503-3>.
- [17] C.C. Lebares, E. V Guvva, N.L. Ascher, P.S. O'Sullivan, H.W. Harris, E.S. Epel, Burnout and stress among US surgery residents: psychological distress and resilience, *J. Am. Coll. Surg.* 226 (2018) 80–90, <https://doi.org/10.1016/j.jamcollsurg.2017.10.010>.

- [18] L.N. Dyrbye, C.P. West, T.D. Shanafelt, Defining burnout as a dichotomous variable, *J. Gen. Intern. Med.* 24 (2009) 440, <https://doi.org/10.1007/s11606-008-0876-6>, author reply 441.
- [19] I.M. Rosen, P.A. Gimotty, J.A. Shea, L.M. Bellini, Evolution of sleep quantity, sleep deprivation, mood disturbances, empathy, and burnout among interns, *Acad. Med.* 81 (2006) 82–85, <https://doi.org/10.1097/00001888-200601000-00020>.
- [20] R. Agha, A. Abdall-Razak, E. Crossley, N. Dowlut, C. Iosifidis, G. Mathew, STROCSS 2019 Guideline: strengthening the reporting of cohort studies in surgery, *Int. J. Surg.* 72 (2019), <https://doi.org/10.1016/j.ijsu.2019.11.002>.
- [21] Clinicaltrials.gov, Protocol registration and results system - record summary. <https://register.clinicaltrials.gov/prs/app/action/LoginUser?ts=1&cx=jg9qo4>, 2021.
- [22] H. Rodrigues, R. Cobucci, A. Oliveira, J.V. Cabral, L. Medeiros, K. Gurgel, T. Souza, A.K. Gonçalves, Burnout syndrome among medical residents: a systematic review and meta-analysis, *PLoS One* 13 (2018), e0206840, <https://doi.org/10.1371/journal.pone.0206840>.
- [23] J. Campbell, A. V Prochazka, T. Yamashita, R. Gopal, Predictors of persistent burnout in internal medicine residents: a prospective cohort study, *Acad. Med.* 85 (2010) 1630–1634, <https://doi.org/10.1097/ACM.0b013e3181f0c4e7>.
- [24] J. Shapiro, B. Zhang, E.J. Warm, Residency as a social network: burnout, loneliness, and social network centrality, *J. Grad. Med. Educ.* 7 (2015) 617–623, <https://doi.org/10.4300/JGME-D-15-00038.1>.
- [25] L. Solms, A.E.M. van Vianen, T. Theeboom, J. Koen, A.P.J. de Pagter, M. de Hoog, Keep the fire burning: a survey study on the role of personal resources for work engagement and burnout in medical residents and specialists in The Netherlands, *BMJ Open* 9 (2019), e031053, <https://doi.org/10.1136/bmjopen-2019-031053>.
- [26] B.M. Spataro, S.A. Tilstra, D.M. Rubio, M.A. McNeil, The toxicity of self-blame: sex differences in burnout and coping in internal medicine trainees, *J. Womens. Health (Larchmt)*. 25 (2016) 1147–1152, <https://doi.org/10.1089/jwh.2015.5604>.
- [27] S.A. Muhammad, F. Zainab, A. Jalil, Working women work-life conflict, *Bus. Strat.* 12 (2011) 289–302, <https://doi.org/10.1108/17515631111185923>.
- [28] M. Mohsin, J. Syed, The missing doctors — an analysis of educated women and female domesticity in Pakistan, *Gender, Work Organ* 27 (2020) 1077–1102, <https://doi.org/10.1111/gwao.12444>.
- [29] M. Fonseca, G. Sanclemente, C. Hernández, C. Visiedo, E. Bragulat, O. Miró, [Residents, duties and burnout syndrome], *Rev. Clin. Esp.* 210 (2010) 209–215, <https://doi.org/10.1016/j.rce.2009.12.006>.
- [30] S. Gomez, N. Khan, M. Malik, M. Saif, *Empirically Testing the Relationship of Social Support, Job Satisfaction and Work-Family Balance in Pakistani Socio Cultural Set-Up*, 2010.
- [31] J.K. Trivedi, H. Sareen, M. Dhyani, Rapid urbanization - its impact on mental health: a South Asian perspective, *Indian J. Psychiatr.* 50 (2008) 161–165, <https://doi.org/10.4103/0019-5545.43623>.
- [32] S.M. Olson, N.U. Odo, A.M. Duran, A.G. Pereira, J.H. Mandel, Burnout and physical activity in Minnesota internal medicine resident physicians, *J. Grad. Med. Educ.* 6 (2014) 669–674, <https://doi.org/10.4300/JGME-D-13-00396>.
- [33] A. Brateanu, B. Switzer, S.C. Scott, J. Ramsey, J. Thomascik, A.S. Nowacki, C. Y. Colbert, Higher grit scores associated with less burnout in a cohort of internal medicine residents, *Am. J. Med. Sci.* 360 (2020) 357–362, <https://doi.org/10.1016/j.amjms.2020.05.045>.