Factors Influencing Resilience and Burnout Among Resident Physicians - A National Survey

Cristina Nituica (nitui1cm@cmich.edu)
Central Michigan University

Oana Alina Bota
Transylvania University

John Blebea
Central Michigan University

Chin-I Cheng
Central Michigan University

Gus J. Slotman
Inspira Medical Center Vineland

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Abstract

Background

Residency training exposes young physicians to a challenging and high-stress environment, making them vulnerable to burnout. Burnout syndrome not only compromises the health and wellness of resident physicians but has also been linked to prescription errors, reduction in the quality of medical care, and decreased professionalism. This study explored burnout and factors influencing resilience among U.S. resident physicians.

Methods

A cross-sectional study was conducted through an online survey, which was distributed to all accredited residency programs by Accreditation Council of Graduate Medical Education (ACGME). The survey included the Connor-Davidson Resilience Scale (CD-RISC 25), Abbreviated Maslach Burnout Inventory, and socio-demographic characteristics questions. The association between burnout, resilience, and socio-demographic characteristics were examined.

Results

The 682 respondents had a mean CD-RISC score of 72.41(12.1), which was equivalent to the bottom 25th percentile of the general population. Males and upper-level trainees were more resilient than females and junior residents. No significant differences in resilience were found associated with age, race, marital status, or training program type. Resilience positively correlated with personal achievement, family, and institutional support ($p < 0.001$) and negatively associated with emotional exhaustion and depersonalization ($p < 0.001$).

Conclusions

High resilience, family, and institutional support were associated with a lower risk of burnout, supporting the need for developing a resilience training program to promote a lifetime of mental wellness for future physicians.

Background

Post-graduate medical residency training, along with continuing changes in modern healthcare, not to mention the Covid-19 coronavirus pandemic, creates a stressful environment and increased risk of burnout. Burnout is defined as a state of mental exhaustion, depersonalization with a decreased sense of personal achievement and is considered a consequence of high levels of stress combined with very ambitious goals[1]. Evidence during the past decade has documented an almost 2-fold increased level of

burnout among healthcare providers in comparison to the general working population with more than half of all physicians reporting at least one symptom of burnout[2]. There is a similar prevalence of burnout among resident physicians in general and among medical and surgical residents [3,4]. Burnout negatively affects many aspects of physicians' personal and professional lives. Studies have shown that burnout negatively affects the ability to provide quality medical care to patients, including effective communication, demonstration of empathy and establishing therapeutic relationships with patients[5–7]. On a personal level, burnout significantly diminishes personal wellbeing and may even lead to suicide[8–11].

As a response to this concerning situation among residents in training, resilience is receiving more attention because of its potential to positively influence health and wellbeing and counter the negative effects of burnout1[2,13]. Resilience is recognized as an indicator of psychological maturity[12,14] and can help residents to cope with the stress inherent in training and their subsequent lives as physicians. Resilient individuals deal more effectively with adversity and the challenges of high workload and high expectations which are characteristics of the medical profession[15–18]. Improving resilience, therefore, can be expected to decrease the development and negative sequel of burnout.

We wished to examine burnout and resilience among U.S. resident physicians in the United States by quantifying the degree of burnout and resilience as well as identifying the demographic and work-related characteristics that are predictive of burnout.

Methods

A cross-sectional study using an online survey was conducted from November 2018 to January 2019. An email invitation to participate in the survey was sent to all residency training program directors and/or program coordinators listed online by Fellowship and Residency Electronic Interactive Database (FREIDA™) in the United States requesting that they forward the survey link to their residents. The email also included a cover letter to the residents asking for their voluntary participation, explaining the confidentiality of results, and providing a hyperlink to the survey. The respondents completed a baseline questionnaire online that included general demographic information, the Abbreviated Maslach Burnout Inventory (AMBI), the Connor-Davidson Resilience Scale (CD-RISC), questions on compliance with ACGME 80 hour duty restrictions, and institutional and family support. The AMBI[19] is an introspective and validated psychological inventory consisting of 9-items pertaining to occupational burnout and incorporates three dimensions: emotional exhaustion (EE), depersonalization (DP), and personal achievement (PA). All AMBI items are scored using a 7-level frequency scale from "never" (0) to "daily" (6). A high score on EE and DP associated with a low score on PA indicates a high level of burnout. The 25-item version of CD-RISC was used to measure resilience[20]. Respondents indicated their level of agreement using a 5-point Likert scale from "strongly disagree" (0) to "strongly agree" (4). The total score was calculated by adding all responses and thus ranges from 0 to 100, with higher scores reflecting greater resilience. We chose a margin of error of 5% and a confidence level of 95% to assess the response rate as adequate with a calculated minimal sample size of 383. The population size was estimated using Association of American Medical Colleges (AAMC) 2019 residency report.

The study was approved by our local Institutional Review Board and the anonymity of the respondents was fully protected with no personal nor program identifiers being collected. Statistical analysis was performed using the SPSS statistical software [IBM Corp, Armonk, NY]. Proportions and frequencies were calculated for categorical variables while means and standard deviation were computed for continuous variables. Group comparisons of categorical variables were made using chi-square ($\chi 2$) testing and continuous variables were compared with linear regression and Pearson's correlation. In the one-way analysis, homogeneity of variance was examined using Levine's test. In situations lacking homogeneity, the Brown-Forsythe test was used instead of one-way ANOVA. Differences between groups were determined by post-hoc Tukey testing. Linear regression was used for multivariate analysis. Statistical significance was set at $P < 0.05$.

Results

There was a total of 848 survey respondents. Of these respondents, 682 (81%) completed all the questions and were thus used for further data analysis. This response rate surpassed our calculated minimal sample size requirement of 383. The demographic details about the participants are presented in Table 1.

Table 1
Demographic characteristics of survey respondents

Variable		N	%	CD-RISC* Mean + SD	P Value
Gender	Female	383	56	71 ± 12	0.014
	Male	299	44	74 ± 13	
Age (years)	Younger than 35	601	88	72 ± 12	0.093
	35 or older	81	12	75 ± 13	
Ethnicity	Caucasians	458	67	73 ± 12	0.107
	Asian / Pacific Islander	113	17	71 ± 13	
	Hispanic	47	7	75 ± 12	
	Multiple ethnicity / Other	36	5	69 ± 11	
	African American	27	4	74 ± 9	
	American Indian or Alaskan Native	1	< 1		
Relationship	Married/ Partnership	452	66	73 ± 12	0.560
	Single, never married	208	31	71 ± 12	
	Separated/ Divorced/ Widow	22	3	73 ± 10	

*CD-RISC = Connor-Davidson Resilience Scale

The responders had almost equal gender distribution women (N = 383, 56%) as compared to men (N = 299, 44%). The majority (N = 601, 88%) were in 25–34 years of age, Caucasians (N = 458, 67%), and married or in a long-term partnership (N = 452, 66%). Gender distribution among training level is depicted in Fig. 1 and reflects the increasing number of graduating medical students, and subsequently residents, being female.

Figure 1. Gender distribution across post graduate year (PGY) training levels

Legend Fig. 1. Males labeled in blue, females labeled in orange. PGY1 = residents in first year of postgraduate training, PGY2 = residents in the second year of postgraduate training, PGY3 = residents in the third year of postgraduate training, PGY4 = residents in the fourth year of postgraduate training, PGY5 = residents in the fifth year of postgraduate training, PGY6 = residents in the sixth year of postgraduate training, PGY7 = residents in the seventh year of postgraduate training, PGY8 = residents in the eighth year of postgraduate training.

Table 2 describes the specialty distribution of the survey respondents. Three quarters, (N = 509, 75%) were in medical specialties while the remainder were surgical residents. A comparison of all residents, reflected in the 2019 AAMC resident distribution by specialty data, indicates that the respondents on the survey were broadly representative of all residents in the U.S.

Table 2
Specialty Distribution of Respondents versus All Residents in U.S.

	Survey Respondents					2019 AAMC Data				
Specialty	**Men**	**%**	**Women**	**%**	**Total**	**Men**	**%**	**Women**	**%**	**Total**
Anesthesiology	22	56	17	44	39	4023	66	2034	34	6057
Child Neurology	2	22	7	78	9	123	32	266	68	389
Dermatology	3	50	3	50	6	562	39	877	61	1439
Diagnostic Radiology / Nuclear Medicine	4	50	4	50	8	4	67	2	33	6
Emergency Medicine	31	61	20	39	51	4941	65	2720	36	7661
Emergency Medicine/ Family Medicine	2	100	0	0	2	18	50	18	50	36
Family Medicine	17	32	37	69	54	5735	46	6663	54	12398
Family Medicine / Preventive Medicine	1	100	0	0	1	10	50	10	50	20
Internal Medicine	21	46	25	54	46	15389	58	11284	42	26673
Internal Medicine / Emergency Medicine	1	50	1	50	2	85	64	47	36	132
Internal Medicine / Medical Genetics	0	0	1	100	1	4	80	1	20	5
Internal Medicine / Pediatrics	4	29	10	71	14	606	41	874	59	1480
Internal Medicine / Preventive Medicine	1	100	0	0	1	14	48	15	52	29
Internal Medicine/ Psychiatry	2	100	0	0	2	56	53	49	47	105

	Survey Respondents				2019 AAMC Data					
Interventional Radiology - Integrated	2	40	3	60	5	172	80	43	20	215
Medical Genetics and Genomics	0	0	1	100	1	22	34	43	66	65
Neurology	9	69	4	31	13	1516	55	1266	46	2782
Neurological Surgery	9	82	2	18	11	1218	83	259	18	1477
Obstetrics and Gynecology	7	12	54	89	61	886	17	4495	84	5381
Ophthalmology	8	47	9	53	17	794	60	538	40	1332
Orthopedic Surgery	18	75	6	25	24	3353	85	610	15	3963
Otolaryngology-Head and Neck Surgery	2	40	3	60	5	1025	64	581	36	1606
Pathology - Anatomic and Clinical	4	31	9	69	13	1125	50	1120	50	2245
Pediatrics	19	25	57	75	76	2461	28	6419	72	8880
Pediatrics / Anesthesiology	1	100	0	0	1	13	34	25	66	38
Pediatrics / Physical Medicine and Rehabilitation	0	0	2	100	2	2	17	10	83	12
Pediatrics / Psychiatry / Child and Adolescent Psychiatry	0	0	3	100	3	22	24	71	76	93
Physical Medicine and Rehabilitation	8	57	6	43	14	843	63	503	37	1346
Plastic Surgery	2	100	0	0	2	142	69	63	31	205
Plastic Surgery - Integrated	1	33	2	67	3	524	59	372	42	896
Preventive Medicine	4	50	4	50	8	142	49	146	51	288

	Survey Respondents					2019 AAMC Data				
Psychiatry	21	35	39	65	60	2934	50	2943	50	5877
Psychiatry / Family Medicine	2	50	2	50	4	18	35	33	65	51
Radiation Oncology	10	67	5	33	15	519	70	225	30	744
Radiology - Diagnostic	12	44	15	56	27	3194	73	1178	27	4372
Surgery - General	21	53	19	48	40	5384	59	3789	41	9173
Thoracic Surgery - Integrated	1	100	0	0	1	158	73	59	27	217
Transitional Year	8	57	6	43	14	798	63	464	36	1262
Urology	14	74	5	26	19	1009	75	342	25	1351
Vascular Surgery - Integrated	5	71	2	0.3	7	212	67	107	34	319
Total	**299**	**44**	**383**	**56**	**682**	**60,056**	**54**	**50,564**	**46**	**110,620**

Descriptive statistics for the Connor-Davidson Resilience Scale showed a mean value of 72 with a median of 72 and a mode of 65. Data analysis demonstrated a normal distribution of scores which allows the use of parametric statistical testing[21]. There were no significant differences in CD-RISC scores based on age, ethnicity, or marital status (Table 1). However, female residents were significantly less resilient ($F = 6.103$, $p = 0.014$) when compared to their male counterparts, with a score of 71 and 74, respectively.

No significant differences in resilience were found among participants from academic versus community hospital-based training program ($F = 2.031$, $p = 0.13$) or geographic regions ($F = 2.522$, $p = 0.06$). The residents in the upper level of training had significantly higher CD-RISC scores when compared to the junior residents ($F = 2.145$, $p = 0.04$) with residents from postgraduate years six to eight (PGY 6–8) being the most resilient with CD-RISC = 80.1 (13.4), followed by the residents from postgraduate year four and five (PGY 4–5) with CD-RISC = 74.1(11.3) and postgraduate year one to three (PGY 1–3) with CD-RISC = 71.6 (12.5).

Specialty distribution was also not found to be correlated to with resilience (F 1.176, $p = 0.24$). However, when comparing the medical and surgical specialties, surgical residents scored higher in resilience than medical residents ($F = 7.169$, $p = 0.008$; CD-RISC = 74.5 (11.5) versus 71.7 (12.3).

There was a significant and positive correlation between family support and higher resilience ($F = 16.941$, $p < 0.001$; Table 3).

Table 3
Factors Associated with Resilience (Pearson Correlation of CD-RISC)

	R	P
Family support	.277**	< 0.001
Considering all of this I like my job	0.505	< 0.001
Compliance with 80 hours restriction	0.133	< 0.001
Personal achievement	0.484	< 0.001
Emotional exhaustion	-0.0477	< 0.001
Depersonalization	-0.305	< 0.001
Number of hours of sleep	-0.014	0.720

Residents with strong family support (always, usually) scored higher than the residents with sporadic or inexistent family support (sometimes, rarely, never). Job satisfaction and residency program support was assessed through five questions and was also found to correlate positively with resilience. There is a positive correlation with the self-affirmation “Considering everything I like my job “ ($R = 0.505$, $p < 0.001$), "There is a positive morale at work" ($R = 0.395$, $p < 0.001$), "This hospital is a good place to work" ($R = 0.364$, $p < 0.001$), "I am proud to work at this hospital" ($R = 0.373$, $p < 0.001$)", and "During my residency I feel like being part of a large family" ($R = 0.335$, $p < 0.001$). No correlation was found between the resilience index and the number of hours of sleep ($R= -0.014$, $p = 0.72$), however the compliance with the 80-hour restriction was a small but significant correlate ($R = 0.133$, $p < 0.001$).

Multivariate linear regression showed five significant factors associated with higher resilience (Table 4): family support, geographic location, surgical specialties, autonomy, and agreeing to the question “Considering everything, I like my job“.

Table 4
Multivariate Analysis and Significance (p values)

Analyzed factors	CD-RISC	Personal Achievement	Emotional Exhaustion	Depersonalization
CD-RISC		< .0001	< .0001	0.0185
Family support	< .0001	0.8569	0.4868	0.8078
Autonomy	< .0001	0.0003	0.4887	0.6198
Considering everything I like my job	< .0001	< .0001	< .0001	0.0016
Surgical specialties	0.0003	0.4885	0.6914	0.3615
Geography	0.0037	0.7543	0.8677	0.1863
I am proud to work at this hospital	0.0738	0.3552	0.0624	0.053
There is a positive morale at work	0.108	0.9013	0.0008	0.9985
Gender	0.1753	0.1736	0.1469	< .0001
Marital Status	0.2291	0.063	0.1211	0.5113
Type of program	0.2348	0.6282	0.8455	0.6457
Age	0.2881	0.0568	0.9577	0.0178
Race	0.4093	0.6977	0.0035	0.0063
Satisfaction with faculty	0.4493	0.2741	0.0992	0.2761
Supervision	0.5693	0.5908	0.3262	0.4344
This hospital is a good place to work	0.6635	0.962	0.2189	0.0378
Compliance with 80 hours rule	0.7725	0.1781	0.3947	0.5493
During my residency I feel being part of a big family	0.8918	0.3026	0.6295	0.6769

The average CD-RISC score for residents that always had family support is 3.4 points higher than that for residents who only usually had family support. The average CD-RISC score for residents that are extremely comfortable being autonomous in making medical decisions is 14.6 points higher than that for residents not at all comfortable in being autonomous. For every one-point increase in Likert scale regarding the question ”Considering everything, I like my job”, the average CD-RISC score increases by 4.5 points. Overall, 64% of the respondents were found to have at least one element of burnout with predominance on emotional exhaustion (58%). Resilience positively correlates with the sense of personal achievement (R =

0.484, $p < 0.001$) and negatively with emotional exhaustion ($R= -0.477$, $p < 0.001$) and depersonalization ($R= -0.305$, $p < 001$).

Each element of burnout was examined using multivariate regression. Personal achievement was positively corelated with autonomy, “Considering everything, I like my job”, and having higher resilience score. Emotional exhaustion had four significant factors: race, disagreeing with the questions “Considering everything, I like my job,” “There is a positive morale at work,” and a low CD-RISC. The emotional burnout for White/Caucasians residents was higher than that for Asian/Pacific islander residents ($p < 0.001$). Although not significant in the multivariate analysis, the emotional exhaustion for residents that were “single/never married” was higher than that for “married/in a partnership” residents ($p = 0.04$). Residents satisfied with their faculty had experienced less emotional burnout ($p = 0.02$), whereas residents that had close/direct supervision reported a higher rate of emotional exhaustion ($p = 0.04$).

We found six significant factors in the multivariate analysis influencing depersonalization: resident under age 35 years ($p = 0.018$), male gender ($p < 0.001$), race ($p = 0.006$), lower CD-RISC ($p = 0.018$), disagreeing with “Considering everything, I like my job” ($p = 0.002$), and “This hospital is a good place to work” ($p = 0.038$). Caucasians residents reported higher depersonalization when compared to Hispanics ($p = 0.007$) and African Americans residents ($p = 0.003$).

Discussion

This study was conducted based on the premise that resident physicians must navigate a complex, contradictory, and stressful environment which makes them vulnerable to burnout. There is ample literature supporting the concept that resilience is inversely correlated with burnout[5,22,23]. In addition, there is genuine concern among academic faculty that there is decreasing resilience among graduate and post-graduate students in the United States that extends to resident physicians. By extension, residents with higher levels of resilience would be expected to better cope and adapt to the stresses of residency. Our study examined to what degree this expectation is correct.

In the original Connor and Davidson 2003 study, mean CD-RISC scores for the U.S. general population was 81, with quartile percentile distribution for Q1, Q2, Q3, and Q4 being 0–73, 74–82, 83–90, 91-100.[20] In comparison, score means for primary care patients and psychiatric outpatients were 72 and 68, respectively. In this context, the resident physician participants from this study had a median of 72, placing them in the lowest 25% of the general population and at a similar level to older primary care patients. Our results are also similar to a prior study that examined resilience in interns[22].

Our results did not demonstrate any difference in CD-RISC resilience scores based on age, marital status, or ethnicity. This is consistent with the findings summarized by Davidson 24

and in the general U.S. population[20]. There were, however, gender differences. We found that male resident physicians were more resilient than females (CD-RISC score of 74 vs 71). Such gender differences vary among different populations and is inconsistent. Connor found no gender differences in the general

population[20] but among medical students, men had higher resilience scores than women in both Canadian[25] and U.S. medical students[26]. Perhaps reflecting a selection bias, females Air Force recruits were more resilient than men[27].

No significant resiliency differences were found among participants from different types of training programs (academic vs. non-academic), specialty or geographic regions. No prior published literature has focused on these characteristics. Although age was not a significant factor for resilience, as also noted in other groups[20,28] the level of training was. Upper-level residents were more resilient than junior residents. PGY 1–3 had CD-RISC scores corresponding to the 25th percentile of the U.S. population while PGY 4–5 improved to the level of the 50th percentile and those in PGY 6–8 were close to 75th percentile. These findings suggest that resilience does not increase with age but rather is enhanced by experience and speaks of the positive effect of the residency training environment.

Family support and friends had a significant and positive effect on increasing resilience, as also seen in other populations[7,29,30]. In addition, resilience positively correlated with personal achievement ($p < 0.001$) and negatively with emotional exhaustion and depersonalization ($p < 0.001$). Similar evidence is found in the literature[26,31–34] and suggests that interventions addressing these areas can improve resilience during residency and thus prevent burnout in our trainees.

Almost two thirds of the survey respondents had at least one element of burnout with a predominance reporting emotional exhaustion. Previously, others had reported burnout from 40–75% among U.S. residents25 comparable with global burnout prevalence of over 50% in other populations[26]. We further found that being single was associated with emotional exhaustion and Caucasians experienced more emotional exhaustion and depersonalization than other ethnic groups.

Our study has several limitations. Although the number of respondents was almost double the required minimum sample size, the overall response rate was low. This is explained by program contact information that was not 100% accurate so that some of the survey requests did not reached their destination. Without direct contact information for the individual residents, we relied on the program directors or coordinators to forward the survey to their trainees, which may not have occurred in many cases due to the large number of survey requests being sent out to programs. The response rate from various groups representing ethnicity, geographic location, and specialties is challenging to calculate but appears to reflect the national AAMC data. Future studies, such as the ACGME directed survey, could include more extensive resilience and burnout inventory scales. Nonetheless, our results are consistent with other studies and suggest foci for attention to increase resilience and decrease burnout in our resident physicians.

Conclusions

This study brings compelling evidence that resilience development should be done not only by teaching individuals to be resilient but also by developing the infrastructure and institutional protective support

system against burnout in healthcare providers.

Abbreviations

ACGME
Accreditation Council of Graduate Medical Education
AMBI
Abbreviated Maslach Burnout Inventory
ANOVA
Analysis of Variance
CD-RISC 25
Connor-Davidson Resilience Scale
DP
Depersonalization
EE
Emotional Exhaustion
FREIDA™
Fellowship and Residency Electronic Interactive Database
IBM Corp
International Business Machines Corporation
PA
Personal Achievement
PGY 6–8
Postgraduate Year six to eight
PGY 4–5
Postgraduate Year four and five
PGY 1–3
Postgraduate Year one to three
SPSS
Statistical Product and Service Solution

Declarations

Ethics approval and consent to participate: The study was reviewed and approved by the Institutional Review Board, Inspira Medical Center, Vineland, NJ, USA. The administrative staff member and IRB Chair determined that the study submission was exempt from IRB review in accordance with the Federal Code of Regulations. The informed consent was waived because the study was a survey that involved minimal risk to the participants and the researchers did not have access to identifiable data.

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analyzed during the current study are not immediate available due to technical support availability but it is freely obtainable from the corresponding author on request, given reasonable time to obtain the necessary technical support. All methods were carried out in accordance with relevant guidelines and regulations in the Ethical Declarations.

Competing interests: The authors declare that they have no competing interests.

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Figures

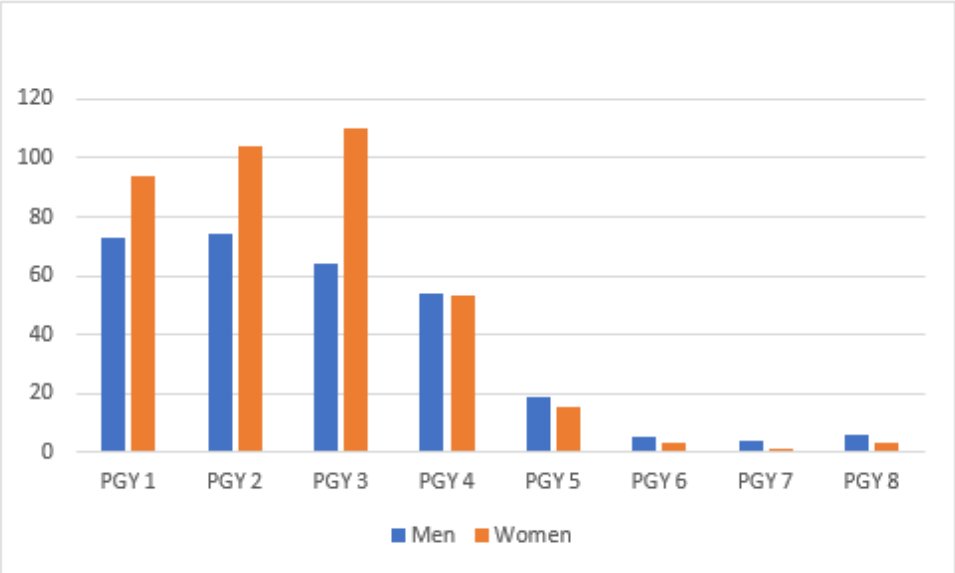

Figure 1

Gender distribution across training levels