

The Correlation of Stress in Residency With Future Stress and Burnout: A 10-Year Prospective Cohort Study

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ABSTRACT

Background Residents and practicing physicians displaying signs of stress is common. It is unclear whether stress during residency persists into professional practice or is associated with future burnout.

Objective We assessed the persistence of stress after residency and its correlation with burnout in professional practice. We hypothesized that stress would linger and be correlated with future burnout.

Methods A prospective cohort study was conducted over 10 years using survey instruments with existing validity evidence. Residents over 3 academic years (2003–2005) were surveyed to measure stress in residency. Ten years later, these residents were sought out for a second survey measuring current stress and burnout in professional practice.

Results From 2003 to 2005, 143 of 155 residents participated in the initial assessment (92% response rate). Of those, 21 were excluded in 2015 due to lack of contact information; follow-up surveys were distributed to 122 participants, and 81 responses were received (66% response rate and 57% of original participants). Emotional distress in residency correlated with emotional distress in professional practice (correlation coefficient = 0.45, $P < .0001$), emotional exhaustion (correlation coefficient = 0.30, $P = .007$), and depersonalization (correlation coefficient = 0.25, $P = .029$). Multivariate linear regression showed that emotional distress in residency was associated with future emotional distress (β estimate = 0.57, $P = .005$) and depersonalization (β estimate = 2.29, $P = .028$).

Conclusions We showed emotional distress as a resident persists into individuals' professional practice 10 years later and has an association with burnout in practice.

Introduction

Rates of stress and burnout among medical students, residents, and practicing physicians are high.^{1–3} Heavy workloads, work-life imbalance, and excessive technological and clerical work have been cited as reasons.^{3–5} Depression, anxiety, hostility, and medical errors are common consequences.^{6–8} Therefore, physician stress and interventions to alleviate it are important topics for investigation.

Many studies examining stress among students, trainees, and practicing physicians employed survey methodologies that suffer from low response rates.^{1–3} There have been few longitudinal studies examining stress or burnout in physicians,^{9,10} and the cross-sectional design of prior work does not examine the potential long-term effects of stress during residency.

We aimed to evaluate whether stress during residency is correlated with stress years after these individuals enter professional practice and whether it

is associated with burnout in practice. We hypothesized that stress in residents would correlate with stress 10 years later and future burnout. We also examined factors that may be associated with stress, burnout, and low career satisfaction in attending physicians, including stress during residency.

Methods

Setting and Participants

We employed a prospective cohort design using a survey. We surveyed trainees from 1 community-based, university-affiliated, internal medicine residency in Long Island, New York, and resurveyed them 10 years later. For 3 academic years (2003–2005), the North Shore University Hospital internal medicine residency included 83 trainees, consisting of 3-year categorical and 1-year preliminary residents. The hospital had a Physician's Resource Network in 2005, which offered free consultation, short-term counseling, and referrals for providers within the health system for trainees.

Each year from 2003 to 2005, all internal medicine residents were asked to complete a survey, developed

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Editor's Note: The online version of this article contains the physician stress study and the study flow diagram

by Seelig et al,¹¹ with validity evidence for measuring stress in residency. No residents were excluded. Ten years later (academic year 2014–2015), we sought out residents who had taken the initial survey and asked them to take a second survey assessing their current levels of stress, burnout, and career satisfaction.

Intervention

The Seelig et al¹¹ stress survey is a 28-item questionnaire, which was found by factor analysis to load into 3 domains: emotional distress (11 items), workload satisfaction (8 items), and learning environment satisfaction (9 items). The emotional distress domain was found to correlate positively with the 64-item Profile of Mood States,¹² a testing instrument with validity evidence to assess current mood. The questionnaire has been used in prior studies to measure stress among trainees.^{11,13} As some participants took the survey once and others took it 2 or 3 times, we used average scores rather than each survey as a discrete data point. Surveys were administered on paper and returned to administrative staff.

In 2014–2015, we combined 3 instruments to measure stress, burnout, and career satisfaction (provided as online supplemental material). Stress was assessed again using the Seelig et al¹¹ items from the emotional distress domain. We did not readminister the workload satisfaction and learning environment satisfaction domains, as they are not applicable outside of residency. Burnout was measured using the 9-item abbreviated Maslach Burnout Inventory (aMBI). Although the full MBI is considered the gold standard, the aMBI has been used as a surrogate in several studies.^{9,10,14} The aMBI includes 3 domains, each consisting of 3 items, which assess emotional exhaustion, depersonalization, and personal accomplishment. Finally, career satisfaction was assessed using the 3-item composite satisfaction score by McManus and colleagues.¹⁴ We also assessed demographic information, such as career specialty, student loan debt, marital status, gender, and participation in employee assistance or wellness programs. The survey was administered via e-mail through a web-based hyperlink from April 9 to June 29, 2015. Reminder e-mails were sent to nonresponders, and follow-up telephone calls were made. Responses were downloaded into an Excel spreadsheet (Microsoft, Redmond, WA) and stored in a secured file.

Outcomes

Individuals' stress scores in residency were compared with their scores 10 years later. After scores were matched, data were deidentified prior to statistical analysis. Our primary outcome was whether high

What was known and gap

Stress in residents and practicing physicians is common, yet it is not clear whether stress during residency is associated with burnout in practice.

What is new

A prospective cohort study assessed emotional distress in residency and elements of distress and burnout in practice.

Limitations

Single site, single specialty study limits generalizability.

Bottom line

Emotional distress in residency is associated with emotional distress and burnout in practice 10 years later.

rates of stress in residency, as measured by emotional distress, correlated with high rates of emotional exhaustion in professional practice. Secondary outcomes included whether stress in residency was correlated or associated with burnout or low satisfaction with a career in medicine in professional practice. We created a conceptual model (shown in the FIGURE) and constructed separate multivariate linear regression models for each outcome to find associated factors. Original emotional distress and covariates for age, gender, marital status, subspecialty, percentage of time spent on patient care, school debt, and participation in employee assistance or wellness programs were included in each model.

The study was approved by the health system's Institutional Review Board.

Analysis

Responders were compared with nonresponders using the chi-square test and 2 sample *t* tests for categorical and continuous variables, respectively. Correlations between stress in residency and burnout in professional practice were assessed using Pearson correlation coefficients. Each component of burnout (emotional exhaustion, depersonalization, and personal accomplishment) was examined individually. We used multivariate regression analysis to measure factors associated with stress, burnout, and career satisfaction. We considered results as statistically significant at the $P < .05$ level. All analyses were performed using SAS version 9.4 (SAS Institute Inc, Cary, NC).

Results

From 2003 to 2005, 155 residents were enrolled in the study and 143 completed the initial stress survey (92% response rate). Twenty-one surveys were excluded due to a lack of reliable contact information, and follow-up surveys were distributed to 122 participants. Of the 84 responses returned, 3 were

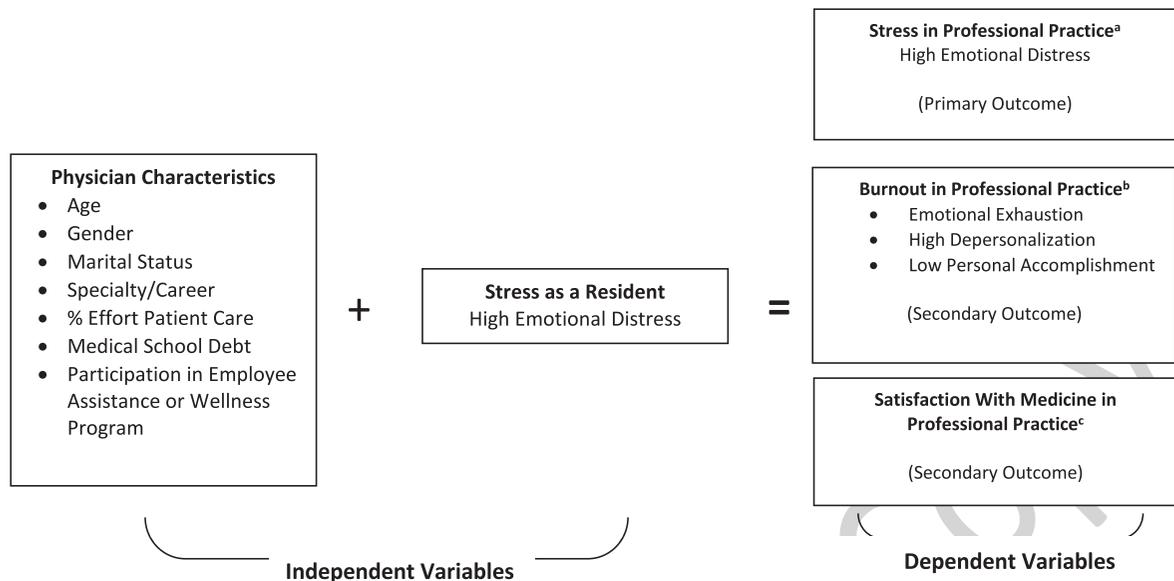


FIGURE
Predicting Emotional Distress and Burnout in Professional Practice

^a Stress measured by emotional distress using 11-item Seelig et al¹¹ questionnaire.

^b Burnout measured by 9-item abbreviated Maslach Burnout Inventory^{9,10,14} questionnaire.

^c Satisfaction measure by 3-item McManus questionnaire.¹⁴

blank and were excluded, and 81 responses were included in the final analysis (66% response rate; 57% of original participants).

TABLE 1 shows the characteristics of the study population in 2015. Respondents' ages ranged from 35 to 52 (mean \pm SD = 39.0 \pm 2.9), and the majority were male (63%, 51 of 81) and married/engaged (83%, 67 of 81). Sixty-six (82%) were subspecialists, and the remainder were primary care physicians or hospitalists. The group spent most of its time in patient care (77% \pm 22%). Nine respondents (11%) reported participation in an employee assistance or wellness program. A majority reported student loan debt (64%, 52 of 81), with 11 (14%) reporting debt of more than \$200,000, and 30 (37%) had more than \$100,000.

Average scores for emotional distress, workload satisfaction, and learning environment satisfaction from the 2003 to 2005 stress surveys for responders to our follow-up survey were compared with individuals who did not respond to the follow-up survey. There was no difference in any of these measures between the 2 groups (TABLE 1).

TABLE 2 shows the Pearson correlation coefficients between the original measures of stress during residency (emotional distress, workload satisfaction, and learning environment satisfaction) and the outcomes from the 2015 follow-up survey (emotional distress, emotional exhaustion, depersonalization, and personal accomplishment). There was a

significant positive correlation between emotional distress as a resident and current emotional distress (correlation coefficient = 0.45, $P < .0001$), current emotional exhaustion (correlation coefficient = 0.30, $P = .007$) and current depersonalization (correlation coefficient = 0.25, $P = .029$).

We performed multivariate linear regressions for primary and secondary outcomes (TABLE 3). We examined original emotional distress, age, gender, marital status, participation in employee assistance or wellness programs, subspecialty, percentage of time spent on patient care, and student loan debt and found a statistically significant association between original emotional distress and current emotional distress (β estimate = 0.57, $P = .005$), using the Seelig et al¹¹ measure, and current depersonalization (β estimate = 2.29, $P = .028$), using the aMBI. Original emotional distress was not statistically significant for emotional exhaustion (β estimate = 1.80, $P = .09$) or personal accomplishment, as measured by the aMBI, or for satisfaction with medicine.

Discussion

We found emotional distress during residency to be univariately correlated with current emotional distress and 2 domains of burnout: emotional exhaustion and depersonalization. *Emotional exhaustion* refers to being emotionally overextended and worn out by one's work, and *depersonalization* describes feelings of detachment and impersonal response toward

TABLE 1
 Characteristics of Study Participants (2015)

Variable	Responders (N = 81), n (%)	Nonresponders and Lost to Follow-up (N = 62), n (%)	P Value
Mean age in years (SD)	39.0 (2.9)	...	...
Sex			
Female	30 (37)	28 (45)	.33
Marital status			
Single/divorced	13 (16)	...	...
Married/engaged	67 (83)	...	...
Not available	1 (1)	...	...
Specialty			
General internal medicine (hospitalist/primary care)	15 (19)	...	...
Subspecialist	66 (82)	...	...
Categorical	64 (79)	41 (66)	.08
Preliminary	17 (21)	21 (34)	
Percent time			
Mean patient care (SD)	76.7 (22.0)	...	...
Mean research (SD)	2.4 (6.4)	...	...
Mean teaching (SD)	8.8 (10.3)	...	...
Mean administrative duties (SD)	10.8 (15.1)	...	...
Participated in an employee assistance or wellness program			
Yes	9 (11)	...	...
No	67 (83)	...	...
Data not available	5 (6)	...	...
Current student loan debt			
0	20 (25)	...	...
Less than \$50,000	6 (7)	...	...
\$50,000 to \$100,000	16 (20)	...	...
\$100,000 to \$150,000	11 (14)	...	...
\$150,000 to \$200,000	8 (10)	...	...
More than \$200,000	11 (14)	...	...
Prefer not to say	4 (5)	...	...
Did not answer question	5 (6)	...	...
	Score (SD)	Score (SD)	
Emotional distress in residency (SD) ^a	2.0 (0.5)	2.0 (0.6)	0.79
Workload satisfaction in residency (SD) ^a	3.9 (0.5)	3.8 (0.5)	0.26
Learning environment satisfaction in residency (SD) ^a	3.8 (0.6)	3.8 (0.6)	0.71
Emotional distress in professional practice ^b	2.5 (0.7)	...	...
Satisfaction with medicine in professional practice ^b	14.2 (3.6)	...	...
Burnout			
Emotional exhaustion in professional practice ^b	5.3 (3.5)	...	...
Depersonalization in professional practice ^b	2.6 (3.3)	...	...
Personal accomplishment in professional practice ^b	15.1 (3.3)	...	...

^a Initial data from survey completed in residency in 2003, 2004, and 2005. Mean score was used for any participant who took the survey more than once (score range, 1–5).

^b Data from 2015 follow-up survey. Score range for emotional distress: 1–5. Score range for satisfaction with medicine, emotional exhaustion, depersonalization, and personal accomplishment: 0–18.

TABLE 2
Univariate Analysis of Stress in Residency With Stress and Burnout in Professional Practice

Outcomes	Average Emotional Distress in Residency			Average Workload Satisfaction in Residency			Average Learning Environment Satisfaction in Residency		
	Pearson Correlation Coefficients	Prob > |r| Under H0: $\rho = 0$	No. of Observations	Pearson Correlation Coefficients	Prob > |r| Under H0: $\rho = 0$	No. of Observations	Pearson Correlation Coefficients	Prob > |r| Under H0: $\rho = 0$	No. of Observations
Outcome 1									
Stress in professional practice									
Emotional distress	0.45	<.001 ^a	75	-0.19	0.11	76	-0.10	0.40	72
Outcome 2									
Burnout in professional practice									
Emotional exhaustion	0.30	<.007 ^a	78	-0.15	0.18	79	-0.07	0.58	75
Depersonalization	0.25	.029 ^a	77	-0.21	0.071	78	-0.18	0.12	74
Personal accomplishment	-0.05	0.67	78	0.02	0.83	79	0.06	0.63	75
Satisfaction									
Satisfaction with medicine	-0.08	0.48	77	0.11	0.35	78	0.21	0.070	74

^a Emotional distress in residency correlated with emotional distress, emotional exhaustion, and depersonalization in professional practice.

TABLE 3
Associations of Emotional Distress in Residency With Emotional Distress, Burnout, and Satisfaction in Professional Practice

Parameter	Outcome 1 Stress in Professional Practice			Outcome 2 Burnout in Professional Practice						Outcome 2 Satisfaction With Medicine in Professional Practice	
	Emotional Distress			Emotional Exhaustion		Depersonalization		Personal Accomplishment		Satisfaction	
	β Estimate (SE)	P Value		β Estimate (SE)	P Value	β Estimate (SE)	P Value	β Estimate (SE)	P Value	β Estimate (SE)	P Value
Intercept	-0.36 (1.19)	.77		5.87 (6.34)	.36	-11.11 (6.19)	.08	21.31 (5.28)	<.001	10.25 (6.94)	.15
Emotional distress in residency	0.57 (0.20)	.005 ^a		1.80 (1.04)	.09	2.29 (1.02)	.028 ^a	-0.04 (0.87)	.97	-0.24 (1.14)	.84
Age	0.03 (0.03)	.24		-0.12 (0.15)	.43	0.17 (0.15)	.26	-0.23 (0.13)	.07	0.09 (0.17)	.61
Gender (female)	0.05 (0.17)	.76		0.24 (0.89)	.79	-0.02 (0.87)	.98	0.59 (0.74)	.43	-1.08 (0.98)	.28
Subspecialist	0.25 (0.23)	.29		1.04 (1.24)	.41	0.07 (1.21)	.96	-1.01 (1.03)	.34	0.89 (1.36)	.51
Percentage of patient care	0.002 (0.005)	.72		-0.008 (0.02)	.76	0.04 (0.02)	.12	0.04 (0.02)	.047	0.01 (0.03)	.87
Marital status											
Single/divorced	0.03 (0.25)	.92		1.44 (1.32)	.28	-0.71 (1.28)	.58	0.96 (1.09)	.38	1.55 (1.44)	.29
Married/engaged	ref	N/A		ref	N/A	ref	N/A	ref	N/A	ref	N/A
Employee assistance program	-0.16 (0.28)	.57		-0.28 (1.48)	.85	0.32 (1.44)	.83	0.71 (1.23)	.57	-1.70 (1.62)	.30
Debt											
<\$100,000	-0.07 (0.22)	.75		-0.37 (1.14)	.75	-0.07 (1.12)	.95	0.66 (0.95)	.49	0.19 (1.25)	.88
\$100,000-\$200,000	0.09 (0.21)	.67		0.84 (1.13)	.46	-0.73 (1.10)	.51	0.15 (0.94)	.87	1.00 (1.24)	.42
>\$200,000	0.02 (0.25)	.93		0.21 (1.35)	.88	0.46 (1.31)	.73	0.73 (1.12)	.52	0.40 (1.47)	.79
No debt	ref	N/A		ref	N/A	ref	N/A	ref	N/A	ref	N/A

Abbreviations: ref, definition; N/A, not applicable.
^a Statistically significant ($P < .05$).

others.¹⁵ Multivariate linear regressions showed that emotional distress during residency was associated with emotional distress and depersonalization in practice 10 years later. Although burnout has typically been defined as needing to include both high emotional exhaustion and high depersonalization, recent research has suggested that depersonalization may be the most significant driver of burnout.^{4,16} Our study showed the largest magnitude of association was between original emotional distress and current depersonalization (β estimate = 2.29).

Our findings add to the literature. While prior studies have examined potential causes and consequences of physician stress and burnout,^{7,8,17,18} to our knowledge, this is the first prospective cohort study to demonstrate emotional distress during residency persists into professional practice and is associated with future depersonalization. McManus et al¹⁰ examined causal links between stress and burnout in physicians in the United Kingdom over 3 years. Other longitudinal studies have looked at predictors of stress and burnout, including intelligence,¹⁴ personality, and learning style.⁹ Our findings differ as we examined emotional distress in residency as the predictor variable for stress and depersonalization in professional practice 10 years later.

Multivariate linear regressions did not show associations with age, gender, marital status, specialty, percentage of time spent in patient care, participation in employee assistance or wellness programs, or current student loan debt. Prior studies on the effect of age and gender on burnout have shown conflicting results.^{19–22}

Our results and those of earlier studies suggest it may be possible to identify residents at increased risk for future stress and burnout. Although the results did not show an association between participation in employee assistance or wellness programs with stress or burnout, only 11% of respondents reported participating in these programs.

Our study has several limitations, including that it is a single-specialty, single-site study, limiting generalizability. Lack of contact information for some original subjects reduced our ability to administer our follow-up survey, and our response rate was 57% of the original participants. We were not able to determine the degree or direction of potential response bias. Some results may not have achieved significance due to sample size, and for participants who took the original survey more than once, we used average scores. While we identified associations, we cannot prove causality.

Future wellness research should examine whether interventions during graduate medical education have sustained effects later in physicians' careers.

Conclusion

Our findings showed emotional distress during residency is correlated with future emotional distress, emotional exhaustion, and depersonalization 10 years later in professional practice.

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