



## RESEARCH ARTICLE

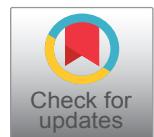
## Stress from Uncertainty Predicts Resilience and Engagement among Subspecialty Medicine Fellows

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### Abstract

**Background:** Burnout is an accelerating phenomenon in the healthcare environment, with implications for physician wellbeing, patient safety, and the quality of healthcare. The ability to manage uncertainty has been identified as a potentially important determinant of burnout in physicians and is now a recognized competency for trainees. No prior studies have evaluated the association of fellows' reaction to uncertainty with burnout metrics, including resilience and engagement.

**Methods:** Cross-sectional online survey in July 2018 of sub-specialty fellows in the Department of Medicine at Massachusetts General Hospital, a large academic medical center, using validated scales of resilience, engagement, empowerment, burnout, and reaction to uncertainty.

**Results:** Of the 317 eligible participants, 102 (32%) completed the reaction to uncertainty scale. In bivariate analyses, stress from uncertainty was significantly higher among women (44.9 (9.7) vs. 38.1 (11.2); p = 0.002), younger fellows (<= 30 years of age) (47.0 (6.3) vs. 39.6 (11.5); p = 0.006), and graduates of US medical schools (42.3 (10.9) vs. 36.1 (10.6); p = 0.03). Stress from uncertainty was inversely correlated with work engagement ( $r = -0.26$ ;  $p = 0.009$ ), work empowerment ( $r = -0.37$ ;  $p = 0.003$ ) and resilience ( $r = -0.38$ ;  $p < 0.001$ ), and positively correlated with burnout ( $r = 0.29$ ;  $p = 0.004$ ).

**Conclusion:** At a time when concern for trainee wellbeing is high, with much speculation about causes of burnout, we find that efforts to decrease stress from uncertainty may pay dividends in reducing burnout, and increasing resilience, engagement and empowerment.

### Keywords

Burnout, Uncertainty, Resilience, Wellbeing, Graduate medical education

### Introduction

Burnout is an accelerating phenomenon in the healthcare environment, with implications for physician wellbeing, patient safety, and quality of healthcare. While many studies and interventions have been directed at medical students, residents, and faculty to better understand what impacts burnout, subspecialty fellows have been largely untargeted, despite being a vulnerable population, critical to the future of patient care. Despite the gap in research relating to fellows, in 2017 the ACGME changed their common program requirements to include provisions for well-being and burnout prevention in accredited fellowship training programs, reflecting the urgent need for this to be brought to the top of hospital priority lists [1]. Fellowship training presents unique challenges, often coinciding with geographic uprooting, increased responsibility, pressure to enter the job market, and loss of the team structure that can define residency. These extrinsic challenges add to the intrinsic challenge of handling uncertainty in the clinical learning environment [2].

The ability to manage uncertainty has been identified as a potentially important determinant of burnout

in physicians [3]. Accepting, understanding, and managing uncertainty has increasingly become a recognized competency for trainees, highlighted by the ACGME [1]. Studies in residents and faculty have linked intolerance of uncertainty to burnout, ineffective communication strategies and inappropriate resource use [3,4]. No prior studies have evaluated the association of fellows' stress from uncertainty with burnout metrics, including resilience and engagement.

## Methods

We conducted an online cross-sectional confidential survey in July 2018 of all 317 sub-specialty fellows in the Department of Medicine at Massachusetts General Hospital to examine burnout, resilience, engagement, empowerment, and stress from uncertainty to enable the department to understand the needs and experiences of fellows.

The primary outcome was stress from uncertainty, measured using the Physicians' Reaction to Uncertainty Scale, developed by Gerrity, et al. [5] which measures affective reactions to uncertainty in clinical situations. The items are rated on a 6-point Likert-type scale, scored so that higher values indicate more stress from uncertainty. Using t-tests or one-way analysis of variance (ANOVA) for continuous variables and Pearson chi square tests for categoric variables, we examined the association of stress from uncertainty with demographic information; personal and professional characteristics; burnout (using single-item measures of emotional exhaustion and depersonalization from the Maslach Burnout Inventory [6]); resilience (using the Resilience Scale 14 [7] where higher scores reflect increased resilience); work engagement (using the Utrecht Work Engagement Scale [8] which measures a work-related state of fulfillment characterized by vigor, dedication, and absorption); and work empowerment (using the Work Empowerment Scale [9] which reflects an individual's sense of self-efficacy and impact). We used Fisher exact tests for categorical comparisons when distributional assumptions of chi-square were not met.

In addition to correlations among continuous scale scores, levels of burnout and resilience were categorized into high vs. low using previously established thresholds [6,7], with participants indicating that they experienced symptoms of emotional exhaustion and depersonalization at least weekly considered to meet the criteria for high burnout. All tests were 2-sided, with a type 1 error level of 0.05. All analyses were performed with the use of commercially available statistical software (Stata version 15; Statacorp, Texas).

## Results

The overall response rate was 42.6% (135 fellows among 317 eligible participants), although 33 of these participants did not complete the stress from uncertainty questions and so were excluded from the analysis.

Of the included respondents 57 (55.9%) were male; 81 (79.4%) were older than 30 years of age; 65 (63.7%) were married or living with a partner; 82 (81.2%) attended US medical schools and 97 (95.1%) had attended US residency programs. Mean burnout score was  $7.8 \pm 3.2$ ; 44 fellows (43.1%) met the criteria for high burnout (Table 1).

Across the study cohort, mean resilience was  $81.7 \pm 11.6$  (range 42-96). According to established cut off points, 59 fellows (57.8%) had high resilience scores (range, 82-98) and 19 fellows (18.6%) had low resilience scores (range, 14-73). Burned out residents were significantly more likely to have low resilience (14%) than non-burned out fellows (5%;  $p = 0.002$ ). Resilience was not related to gender, age, and location of medical school or residency. Interestingly, resilience decreased as fellow year increased (year 1,  $82.7 \pm 10.7$ ); year 2,  $82.1 \pm 10.9$ ; year 3,  $76.9 \pm 15.7$ ; year 4,  $76.7 \pm 21.6$ ;  $r = -0.15$ ,  $p = 0.15$ .

In bivariate analyses, stress from uncertainty was significantly higher among women (44.9 (9.7) vs. 38.1 (11.2);  $p = 0.002$ ); younger fellows ( $\leq 30$  years of age) (47.0 (6.3) vs. 39.6 (11.5);  $p = 0.006$ ); and graduates of US medical schools (42.3 (10.9) vs. 36.1 (10.6);  $p = 0.03$ ). Stress from uncertainty did not vary significantly by year of fellowship, marital status, or location of residency.

Stress from uncertainty was inversely correlated with work engagement ( $r = -0.26$ ;  $p = 0.009$ ), work empowerment ( $r = -0.37$ ;  $p = 0.003$ ) and resilience ( $r = -0.38$ ;  $p < 0.001$ ), and positively correlated with burnout ( $r = 0.29$ ;  $p = 0.004$ ). In addition, fellows who met criteria for high burnout were more stressed by uncertainty (43.8 (10.8) vs. 39.2 (10.4),  $p = 0.04$ ) as were fellows who met criteria for low resilience (46.1 (12.4) vs. 37.0 (9.4),  $p = 0.001$ ), Table 1.

## Discussion

Despite the remarkable trajectory of biomedical research over recent decades, uncertainty will always be part of clinical medicine [10]. Indeed, it is likely to increase with the growth of data, informatics, and treatment options. This study adds new knowledge suggesting stress from uncertainty is correlated with burnout among subspecialty fellows, as well as the related experiences of resilience, work engagement, and work empowerment. Forty-three percent of surveyed fellows (44 fellows) met the cut off for risk of burnout (reporting symptoms at least weekly). This is similar to rates previously reported in neurology and oncology fellows [11,12].

This study builds on earlier research evaluating stress from uncertainty and burnout in medical students, residents, and faculty [3,4,13]. While we found females to have higher levels of stress from uncertainty, previous studies have been inconsistent in finding gender differences [3,14]. There has also been previous inconsisten-

**Table 1:** Reaction to uncertainty for subspecialty fellows in the Department of Medicine.

Variable	N (%) (N = 102)	Reaction to uncertainty Mean (SD)	P value
<b>Gender*</b>			
Male	57 (55.9)	38.1 (11.2)	0.002
Female	44 (43.1)	44.9 (9.7)	
<b>Age</b>			
<= 30 years	21 (20.6)	47.0 (6.3)	0.006
> 30 years	81 (79.4)	39.6 (11.5)	
<b>Marital status*</b>			
Single/Separated	33 (32.4)	41.6 (10.0)	0.68
Married/Live with partner	65 (63.7)	40.6 (11.7)	
<b>Medical school**</b>			
US med school	82 (81.2)	42.3 (10.9)	0.03
International med school	19 (18.8)	36.1 (10.6)	
<b>Residency</b>			
US residency	97 (95.1)	41.5 (11.0)	0.22
International residency	5 (4.9)	35.2 (10.8)	
<b>Year of fellowship</b>			
Year 1	59 (57.8)	40.2 (10.0)	0.29
Year 2	28 (27.4)	42.3 (11.3)	
Year 3	12 (11.9)	42.3 (11.5)	
Year 4	3 (2.9)	45.0 (27.1)	
<b>Resilience**</b>			
High	59 (57.8)	37.0 (9.4)	0.001
Low	19 (18.6)	46.1 (12.4)	
<b>Burn out**</b>			
High	44 (43.1)	43.8 (10.8)	0.04
Low	53 (54.6)	39.2 (10.4)	

\*Missing data ("prefer not to answer" selected); \*\*Missing data (no answer selected).

cy with tolerance of uncertainty and age, with some reporting increased tolerance with older age [15-17], some demonstrating tolerance is higher with younger age [18], and some showing no association [19]. We found fellows less than 30 years of age and those that trained at US medical schools to have highest stress from uncertainty. This may reflect less experience in managing uncertain situations and may reflect an increased propensity for those with higher tolerance of uncertainty to seek to leave their home country and embrace the uncertainty of geographic relocation. Interestingly, stress from uncertainty appeared to increase with year of fellowship, though this was not statistically significant.

The ability to deal with uncertainty is increasingly recognized as a major goal of medical education and growing evidence suggests it may be possible to decrease stress from uncertainty by talking openly about uncertainty in clinical settings, proactively addressing it in management plans, and communicating uncertainty to patients [10,20]. Identifying and effectively managing trainee burnout has proven to be extremely

difficult, with high rates persisting in numerous studies over time, despite increased attention to this issue. This study supports the hypothesis that efforts to improve management of uncertainty may be useful for addressing burnout among trainees. Reframing and acknowledging uncertainty as a surmountable challenge, not a threat, could potentially help quell some of the associated anxiety.

Limitations of this study include its small size and single site, though there is no reason to postulate that similar predictors of stress from uncertainty would be unique to medicine or this academic health center. Although we used measurement scales that have strong validity evidence, they are self-reported and potentially susceptible to social desirability bias. To address this, we collected responses in a de-identified and confidential manner and participants were unaware of the specific hypothesis of this study. The survey response rate for fellows was 43% (135/317), with 32% (102/317) answering the stress from uncertainty questions and therefore being included in the analysis. These numbers

are similar to other published studies on medical trainees [21-27], and we obtained statistically significant findings with our respondent population. Because the survey was cross-sectional, we are unable to determine causality or potential direction of effect for the associations observed.

Our findings give impetus to further psychometric and conceptual research on tolerance of uncertainty with further studies needed that concentrate on links between reactions to uncertainty and patient outcomes to establish to what extent it affects quality of care.

## Conclusion

At a time when concern for trainee wellbeing is high, with much speculation about causes of burnout, we find that efforts to decrease stress from uncertainty may pay dividends in reducing burnout, and increasing resilience, engagement and empowerment. Reducing stress from uncertainty may positively impact physician wellbeing, patient safety, and healthcare delivery.

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