

# Professional Well-being of Faculty Scientists at Stanford University School of Medicine

The World Health Organization classifies burnout as an occupational syndrome resulting from chronic, unmanaged workplace stress, characterized by exhaustion, detachment from- or negativity toward- work, and decreased occupational efficacy.<sup>1</sup>

Levels of professional fulfillment and burnout contribute to an individual's personal and professional well-being.<sup>2</sup> Burnout is a risk factor for type 2 diabetes,<sup>3</sup> heart disease,<sup>4</sup> and depression.<sup>5</sup> Burnout also attenuates creativity and productivity.<sup>6-10</sup>

Scientists often work long hours and manage a number of work related stressors including scarcity of funding, and pressure to publish, educate, and influence. One in four doctorate-level professionals experience burnout.<sup>11</sup> Reducing burnout and cultivating professional fulfillment in faculty scientists is integral to the Stanford WellPhD mission of advancing the well-being of Stanford scientists, which augments their sustainable productivity and thereby serves the beneficiaries of their contributions.

The purpose of this report is to describe the results of the 2019 Stanford School of Medicine (SoM) Scientist Wellness Survey, including descriptive data on professional fulfillment and burnout. The survey also explored the effects of hypothesized determinants of professional fulfillment and burnout on these outcomes.

## Executive Summary

Of all 369 scientists across 28 clinical and basic science departments in the SoM who were invited to participate in the survey, 177 (48%) responded. 46% of respondents experienced

high professional fulfillment, whereas 32% experienced high burnout. Key drivers that had substantial effect sizes on these outcomes included self-valuation,<sup>1</sup> impact of work on personal relationships, sleep related impairment and leadership behaviors. Other factors linked to occupational distress included having or adopting a child within the past year, paperwork, bureaucracy, administrative meetings, and busywork.

## Key Findings

1. 81 (46%) of scientists surveyed experience professional fulfillment (score  $\geq 7.5$  on 0-10 scale).
2. 56 (32%) of scientists surveyed experience burnout
3. Self-valuation and impact of work on personal relationships had the largest effects on burnout.
4. Self-valuation and leadership behaviors had the largest effects on professional fulfillment.
5. Career stability related stress, cognitive task load, work-place financial stress, and work-place efficiency-related factors stress had significant but smaller effects on burnout and professional fulfillment.
6. Overall burnout was higher among the 8 scientists who had or adopted a child within the previous 12 months compared with other scientists—including those who had experienced marriage, divorce/separation, loss of a pet, a major personal illness or that of a close family member, or loss of a loved one.
7. Paperwork, bureaucracy, administrative meetings, busywork and the possibility they will have to lay off members of their

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<sup>1</sup> We defined self-valuation as appropriate prioritization of self-care coupled with a growth mindset response—rather than a harsh internal response—to perceived personal imperfections or errors.

lab due to inadequate funding were identified by the greatest proportion of scientists as contributing “very much” to their stress over the past two weeks.

8. More than half (51%) of scientists who answered a question about work hours reported working 60 or more hours per week.
9. A multivariable model with independent variables for gender, faculty rank, leadership behaviors, negative effects of work on personal relationships, sleep-related impairment, self-valuation, and career-stability related stress accounted for 57% of variance in burnout among scientist. This suggests these hypothesized drivers of burnout among scientists as a group do explain much of the variability in burnout level among scientists at Stanford.
10. A model with the same independent variables as above, plus cognitive task load accounted for 43% of the variance in professional fulfillment.
11. Contrary to expectation, the multivariate model adjusted effect of higher task load on professional fulfillment was positive.
12. Professional fulfillment was higher [ES (standard deviation units of difference) = 0.21;  $p < 0.001$ ] and burnout was lower [ES = 0.28;  $p < 0.001$ ] among basic scientists than among medical staff faculty physicians by small but statistically significant margins.

## Methods:

### Sample

We invited all non-clinical doctoral faculty within clinical and basic science departments at Stanford University School of Medicine to participate in the Faculty Scientist Wellness Survey. Responses were gathered from May 20, 2019 to June 17, 2019. Clinically credentialed physician scientists were not included in this survey, as they were invited to participate in medical staff wellness survey.

### Measures

The Stanford Professional Fulfillment Index assesses professional fulfillment and burnout—including dimensions of work exhaustion and interpersonal disengagement consistent with symptoms identified by the WHO. Although related to occupational efficacy—the third component identified by the WHO definition of burnout, professional fulfillment is an aspirational construct distinct from burnout that is appropriate to measure separately.<sup>2</sup>

The Stanford scientist survey included outcome measures of professional fulfillment and burnout as assessed with the Professional Fulfillment Index, adapted for non-clinical populations. In addition, the survey evaluated several hypothesized drivers of these outcomes:

- **Organizational Culture of Wellness:** organizational values, behaviors and leadership that prioritize personal and professional growth, community, and compassion for self and others. Drivers specifically evaluated within the survey include gratitude, leadership behaviors, and values alignment.
- **Organizational Efficiency of Practice:** workplace systems, processes, and practices that promote safety, quality, effectiveness, positive interactions, and work-life balance. Drivers specifically evaluated within the survey include cognitive task load.
- **Personal Resilience:** individual skills, behaviors, and attitudes that contribute to physical, emotional, and professional well-being. Drivers specifically evaluated within the survey include sleep-related impairment, impact of work on personal relationships, and self-valuation.

The survey also included a new set of items intended to assess work-specific stressors common among faculty scientists.

### Analyses

The new item set of nine work-specific stressors common among faculty scientists were analyzed

using factor analysis with Varimax (orthogonal) rotation to create factor-based scales.

We calculated correlation coefficients to estimate univariate effects of hypothesized determinants of burnout and professional fulfillment on these outcome variables.

We also constructed two multivariable models with burnout and professional fulfillment as the dependent variables with hypothesized determinants of these variables as independent variables. We used stepwise model selection based on Akaike’s Information Criterion, with forced model entry of variables to control for gender and faculty rank. We calculated standard deviations of difference to estimate Cohen’s D effect size (ES).

**Results:**

*Descriptive data and exploratory analyses of group differences*

Of all 369 scientists across 28 clinical and basic science departments in the SoM who were invited to participate in the survey, 177 (48%) responded. Aggregate demographic variable profile data is presented in Section 1.

Of the 173 respondents who answered a question about hours worked per week, more than half (51%) reported working 60 or more hours per week.

Non-clinical faculty in both clinical and basic science departments have higher levels of burnout than would be optimal. Although differences were small [ES (standard deviation units of difference) < 0.30] and were not statistically significant, scientists working in basic science departments (n = 55) fared marginally better than scientists working in clinical departments on measures of professional fulfillment (ES = 0.26; p = 0.17), work-exhaustion (ES = 0.16; p = 0.34), interpersonal disengagement (ES = 0.17; p = 0.32), and overall burnout (ES = 0.18; p = 0.28). Scores on self-valuation were identical to two significant digits

for scientists in basic versus clinical departments, and nearly identical for sleep-related impairment.

Aggregate responses to questions about specific potential contributors to work related distress are presented in Table 1. Responses were on a five-point Likert scale from “Not at all” to “Very much.” The most commonly endorsed contributor to work-related distress was “paperwork, bureaucracy, administrative meetings, and busywork,” which 56% of scientists indicated contributes “quite a bit” or “very much” to stress.

Among the 160 scientists who reported information on grant submission, the mean(SD) number of grants submitted per scientist as PI or Co-PI was 5.6(8.7) in the last year, with a mean(SD) total number of grants per scientist of 13.1(20.6) per year. The median numbers of grants per year per scientist as PI or Co-PI and total were 4 and 7 respectively.

**Table 1: Subjectively rated stress of specific contributors to scientists’ stress load**

<i><b>How much did each of the following contribute to your stress over the past two weeks?</b></i>	<i><b>Quite A Bit or Very Much, N (%)</b></i>
Paperwork, Bureaucracy, Administrative Meetings, Busywork	92/165 (56%)
Possibility I Will Not Be Able To Cover My Own Salary With Grant Funding	68/164 (41%)
Possibility I Will Have To Lay Off Members Of My Lab Due To Inadequate Funding	66/164 (40%)
Lack Of Support With Grant And Manuscript Preparation	54/165 (33%)
My Academic Advancement	50/164 (30%)
Pressure To Be First To Publish	47/165 (28%)
My Personal Job Security	38/165 (23%)
Competitive Environment Among Other Scientists In My Institution	25/165 (15%)
Managing Interpersonal Issues Between Members Of My Research Group	20/165 (12%)

Overall burnout was higher among the 8 scientists who had or adopted a child within the previous 12 months compared with those who had not (ES = 0.76; p = 0.007). Sleep deprivation

was the most common challenge, endorsed by 8 out of 9 responders who had taken parental leave after arrival of their youngest child within the past three years. Other recent life events in the past year including move or relocation (n = 26), marriage (n = 5), loss of a pet (n = 16), personal illness (n = 10) or illness of a close family member (n = 41), or loss of a close family member (n = 19) were not significantly associated with level of occupational burnout. Other major life events in the past year including divorce or separation, loss of a child, or loss of a close friend were not common (n < 5). Having a child with special needs (n = 11) and being a caregiver for an adult (n = 13) were not significantly associated with burnout level.

Differences in burnout and professional fulfillment across ranks were small and were not statistically significant. Differences in work hours across academic ranks, gender, and parenting status were small and were not statistically significant.

#### *Factor analysis of items measuring Scientists' work stress*

The analysis yielded 3 factors explaining a total of 50% of the variance for the set of questions designed to ascertain work stress likely to be common among scientists. Factor 1 was labeled *work-place financial stress* due to the high loadings on an item assessing work-stress associated with possibility of not being able to cover one's own salary with grant funding and an item assessing the possibility of having to lay off members of the lab due to inadequate funding. A second factor was labeled *career stability related stress*, with high factors loadings on items assessing work stress due to job security and academic advancement. A third factor, labeled *work-place efficiency-related factors stress*, had high factors loadings on items assessing stress attributable to lack of grant writing support, administrative tasks, bureaucracy and busywork, pressure to publish, competitive environment within Stanford, and interpersonal issues between work-group members. Based on these results, we

created factor-based scales using items loading highly on each of these factors, with scale scores standardized to on a 0 to 10 range.

#### *Determinants of scientists' professional fulfillment and burnout*

Univariate correlations between hypothesized determinants of professional fulfillment and burnout and these outcomes were all statistically significant (see Table 2).

We observed medium effect sizes (correlations > 0.30) for the univariate effects on personal fulfillment of leadership behaviors, self-valuation, impact of work on personal relationships, and sleep-related impairment. Effects on burnout of self-valuation and impact of work on personal relationships were large (correlations > 0.50). We observed medium effect sizes on burnout of sleep-related impairment, leadership behaviors, career stability stress, and cognitive task load. The effects of work-place financial stress and work-place efficiency-related factors stress were small (< 0.30).

**Table 2: Correlations with Burnout and Professional Fulfillment**

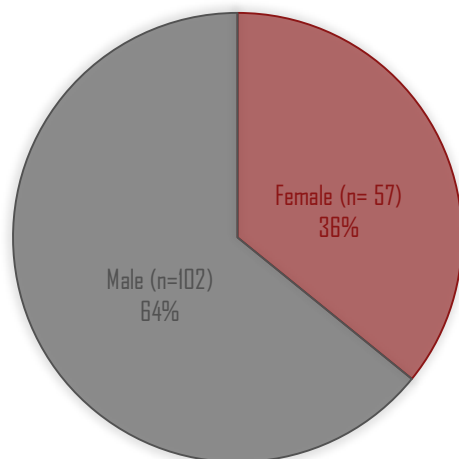
Drivers	Correlation <sup>a</sup> (Burnout)	Correlation <sup>a</sup> (Professional Fulfillment)
Self-Valuation	<b>-0.634</b>	<b>0.410</b>
Impact Of Work On Relationships	<b>0.598</b>	<b>-0.388</b>
Sleep Related Impairment	<b>0.485</b>	<b>-0.343</b>
Leadership Behaviors Score	<b>-0.388</b>	<b>0.432</b>
Career Stability Related Stress	<b>0.311</b>	-0.288
Cognitive Task Load	<b>0.304</b>	-0.076
Work-Place Financial Stress	0.264	-0.169
Work-Place Efficiency-Related Factors Stress	0.224	-0.262

<sup>a</sup>Correlations >0.3 are in bold.

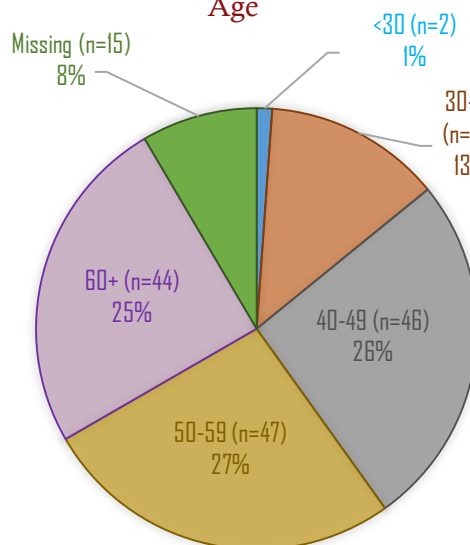
### Section 1: Aggregate Demographic Variable Profile Data

The modal category responses for participants were as follows: white, male, 50 years of age or older, living with a significant other, living with one or more dependent children, university tenure time, and rank of professor.

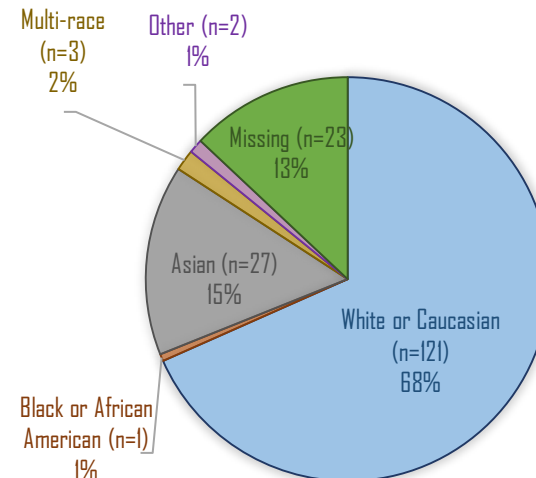
Gender



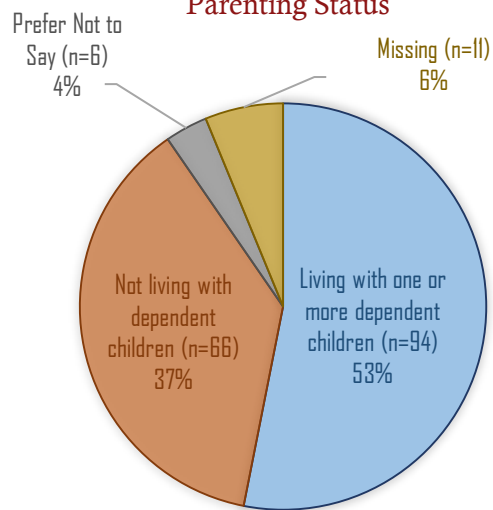
Age



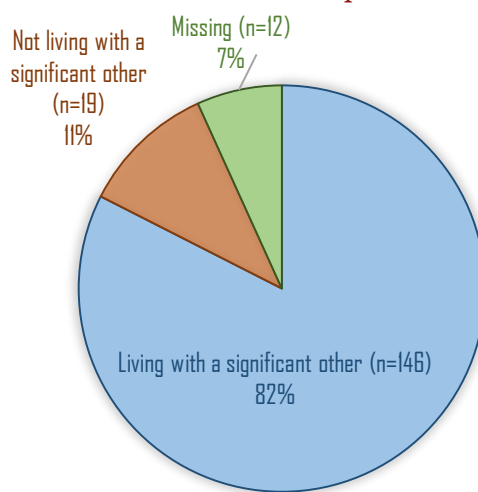
Race



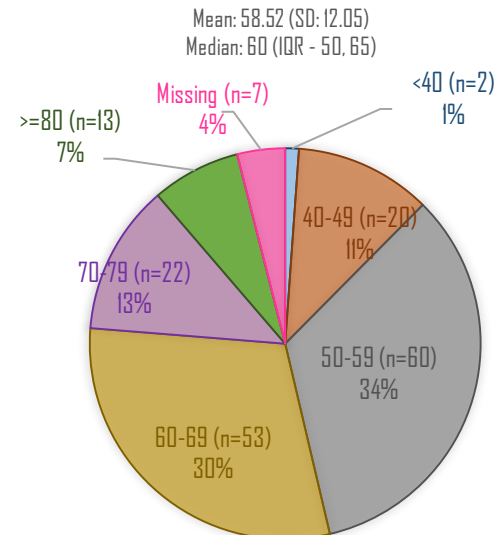
Parenting Status

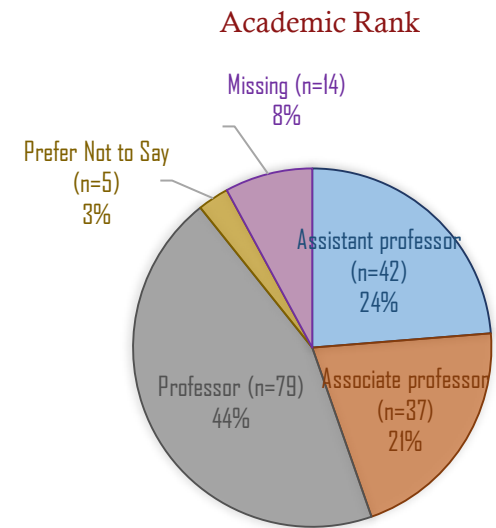
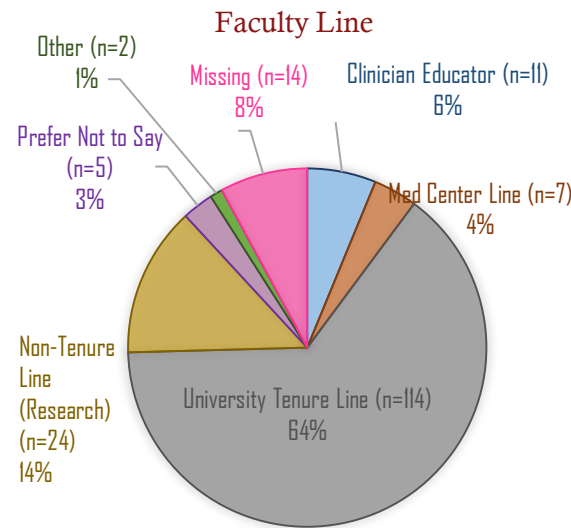


Relationship Status



Hours Worked Per Week





Department										
Clinical Departments					Basic Science Departments				Other	
Psychiatry & Behavioral Sciences (n=14)	Pathology (n=9)	Radiology (n=8)	Neurology & Neurological Sciences (n=7)		Microbiology & Immunology(n=10)		Bioengineering (n=6)		Prefer Not to Say (n=20)	
Neurosurgery (n=7)	Ophthalmology (n=5)	Otolaryngology-Head & Neck Surgery (n=4)		Comparative Medicine (n=6)						
					Medicine (n=12)	Pediatrics (n=7)	Radiation Oncology (n=3)	Anesthesiology, Perioperative &... (n=2)	Surgery (n=2)	Chemical & Systems Biology (n=4)
		Cardiothoracic... (n=1)	Urology (n=1)	Health Research & Policy (n=6)				Developmental Biology (n=4)	Molecular & Cellular Physiology (n=3)	

In a multivariable model controlling for gender and faculty rank, leadership behaviors, negative effects of work on personal relationships, sleep-related impairment, self-valuation, and career-stability related stress all significantly impacted burnout. The set of independent variables in the model accounted for 57% of the variance in burnout. When the same model was specified with professional fulfillment as the dependent variable, the same set of independent variables were significant, in addition to cognitive task load—which had a significant effect in multivariable analysis on professional fulfillment but not on burnout. The set of independent variables accounted for 43% of the variance in professional fulfillment in the multivariable analysis. Contrary to expectation, higher task load was associated with higher professional fulfillment in the multivariable model.

#### *Comparison between scientists and medical staff*

Professional fulfillment was higher ( $ES = 0.21$ ;  $p < 0.001$ ) and burnout was lower ( $ES = 0.28$ ;  $p < 0.001$ ) among basic scientists than among medical staff faculty physicians by small but statistically significant margins. Scientists also fared better than medical staff by small ( $ES < 0.30$ ) but statistically significant margins on measures of self-valuation and impact of work on personal relationships. Differences between scientists and medical staff of measures of interpersonal disengagement and sleep related impairment were not significant. Composite cognitive load scores were higher ( $ES = 0.24$ ;  $p = 0.002$ ) among medical-staff physicians than among scientists.

### **Discussion**

Descriptive results from this report may suggest potential opportunities to assist groups with particularly high burnout levels. It may be equally valuable to learn about what groups with high levels of professional fulfillment may be doing that contributes to professional wellness. However, department level results represent remarkably small group sample sizes, suggesting

that these results are most useful as talking points that lead to conversations about contributors and detractors to professional wellness in all departments. It is important to note that the cross-sectional design of this survey data analysis limits information about causal relationships that we can derive from these results. However, the large effect of self-valuation on burnout is consistent with previous research and represents a theoretically plausible causal relationship.<sup>12</sup> The medium effect of leadership behaviors on professional fulfillment is also consistent with previous research and represents another theoretically plausible causal relationship.<sup>13</sup> Interventions designed to improve these hypothesized determinants of professional wellness are worth testing.

Although the individual effects of work-specific stressors (career stability related distress, work-place financial stress, and work-place efficiency related factors stress) on both burnout and professional fulfillment are small, they represent potential opportunities to intervene in ways that help scientists specifically. For example, over 40% of respondents indicated that 1) the possibility that they will not be able to cover their salary with grant funding, 2) the possibility that they will have to lay off members of their lab due to inadequate funding, and 3) paperwork, bureaucracy, administrative meetings, and busywork were either “quite a bit” or “very much” contributors to their stress over the past two weeks. Of these 3, the former 2 concerns around funding may be mitigated through long term solutions. The latter—paperwork, bureaucracy, administrative meetings, and busywork—was identified most often as a contributor to stress. Systematic strategic, organizational efforts to improve these factors may render improved wellbeing at modest cost. Optimizing efficiency by reducing “busywork” can increase productivity and allow faculty to increase their focus on work from which they derive meaning. This may in turn reduce burnout<sup>14</sup> and improve professional fulfillment.

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