
Demographics in distress: a national study of burnout and well-being of resident physicians in high-burnout specialties

Received: 3 June 2025

Accepted: 23 January 2026

Published online: 30 January 2026

Cite this article as: Tan S.F., Siddiqui H., Paur B. *et al.* Demographics in distress: a national study of burnout and well-being of resident physicians in high-burnout specialties. *BMC Med Educ* (2026). <https://doi.org/10.1186/s12909-026-08702-0>

Sydney F Tan, Hana Siddiqui, Bridget Paur, Srideepti Marada, Lauren Cortright, Natasha Ignatowski, Dawn M Elfenbein, Vincent Minichiello, Bruce Barrett, Richard J Davidson & Simon B Goldberg

We are providing an unedited version of this manuscript to give early access to its findings. Before final publication, the manuscript will undergo further editing. Please note there may be errors present which affect the content, and all legal disclaimers apply.

If this paper is publishing under a Transparent Peer Review model then Peer Review reports will publish with the final article.

Demographics in Distress: A National Study of Burnout and Well-being of Resident Physicians in High-Burnout Specialties

Authors:

Sydney F Tan, MD¹; Hana Siddiqui, BA², Bridget Paur, BA², Srideepti Marada, BS³, Lauren Cortright³, Natasha Ignatowski, BS², Dawn M Elfenbein, MD, MPH, FACS¹; Vincent Minichiello, MD, ABoIM⁴; Bruce Barrett, MD, PhD⁴; Richard J Davidson, PhD^{3,5,6}; Simon B Goldberg, PhD^{3,7}

Affiliations:

1. Department of Surgery, University of Wisconsin School of Medicine and Public Health, Madison, WI 53792, USA.
2. University of Wisconsin School of Medicine and Public Health, Madison, WI 53792, USA.
3. Center for Healthy Minds, University of Wisconsin-Madison, Madison, WI 53703, USA.
4. Department of Family Medicine and Community Health, University of Wisconsin School of Medicine and Public Health, Madison, WI 53792, USA.
5. Department of Psychology, University of Wisconsin-Madison, Madison, WI 53703, USA.
6. Department of Psychiatry, University of Wisconsin School of Medicine and Public Health, Madison, WI 53792, USA.
7. Department of Counseling Psychology, University of Wisconsin-Madison, Madison, WI 53703, USA.

Corresponding Author:

Sydney F Tan

600 Highland Ave, MC7375

Madison, WI 53792

USA

ORCID: 0000-0002-2178-1139

Email: stan75@wisc.edu

Abstract

Background

Resident burnout harms learning and negatively affects patient care, physician retention, and healthcare costs. Programs are increasingly prioritizing resident well-being. However, literature focuses on resident burnout, often overlooking well-being, and post-pandemic well-being has not been evaluated across specialties. This study assessed post-pandemic burnout and well-being among frontline residents nationwide and examined associations with demographics.

Methods

A nationwide, cross-sectional survey in 2024 was conducted as part of a randomized controlled trial evaluating a well-being training among residents in high-burnout specialties (surgery, obstetrics-gynecology, family, internal, and emergency medicine). The survey assessed burnout and well-being outcomes. Prevalence rates of burnout or low well-being were calculated and compared across demographics. Regression models assessed associations with well-being, adjusting for demographic characteristics.

Results

540 residents responded. The sample was predominantly cisgender women (67%), White (67%), and in a non-surgical medical specialty (56%). Most residents (68%) had elevated stress, 83% had burnout, and 92% had elevated loneliness. Surgery

residents and mid-level residents had higher burnout on the depersonalization subscale ($p < .01$) while Black residents had lower depersonalization ($p < .01$). Women had lower resilience ($p < .001$), flourishing ($p < .001$), and self-efficacy ($p < .001$). Compared to those married or in long-term relationships, single residents had higher loneliness and lower meaning and purpose ($p < .001$).

Conclusions

Evidence suggests worsening trends among resident physicians concerning various aspects of burnout and well-being, and certain demographic groups are at higher risk. Our findings underscore the critical need for targeted well-being interventions in residency.

Trial Registration: clinicaltrials.gov Identifier: NCT06149156, registered 11/28/2023

Background

Resident physicians experience high burnout rates.^{1,2} Burnout is a syndrome in response to overwhelming stress characterized by emotional exhaustion (feeling drained or depleted), depersonalization (cynicism or detachment towards patients or colleagues), and reduced personal accomplishment (diminished sense of competence or achievement in work).^{3,4} Burnout often begins in medical school⁵ and worsens in residency due to increasing clinical, research, and administrative demands.⁶⁻⁸ This has negative effects on physician and population health as burnout is linked to higher divorce, substance use, depression, and suicide rates among physicians⁹ while also increasing medical errors, compromising patient care, and driving physician attrition.^{10,11}

Resident well-being extends beyond the absence of burnout, encompassing psychological and physical health, life satisfaction, purpose, and social relationships.^{12,13} While the Accreditation Council for Graduate Medical Education (ACGME) promotes shifting beyond burnout and advocates for well-being initiatives,¹⁴ research predominantly focuses on burnout, with few studies on broader well-being.^{15,16}

Discussions on resident well-being must also consider COVID-19 pandemic's effects. COVID-19 strained healthcare systems, disrupted training, heightened burnout in frontline residents,¹⁷⁻¹⁹ and accelerated the shift towards virtual medical education.²⁰ The long-term, post-pandemic effects on resident burnout and well-being remain unclear and there is a paucity of nationwide, multispecialty research in this area.

This study aims to assess post-pandemic resident burnout and well-being rates and evaluate demographic differences to identify groups at elevated risk.

Methods

Participants

We conducted a nationwide, cross-sectional survey in 2024 as baseline assessment for a randomized controlled trial evaluating a well-being intervention for residents in high-burnout specialties²¹: surgery and surgical subspecialties, obstetrics-gynecology, family, internal, and emergency medicine.

We invited eligible U.S. residency participants in 2024 through online residency and program director listservs, social media platforms, and word of mouth.

Program directors and administrators received email invitations containing study details, and those interested shared with residents. Additionally, we used social media posts through the University of Wisconsin-Madison (UW-Madison) Department of Surgery and the Center for Healthy Minds as well as resident word-of-mouth outreach to promote the survey.

Interested residents underwent a screening questionnaire for eligibility, which included current enrollment in a target specialty, no daily or near-daily meditation

in the past six months, and no previous participation in the well-being training (Healthy Minds Program app). Ineligible participants included those not in a target specialty, who regularly meditated, or used the app (Supplementary Digital Appendix, eMethods 1). Participants were paid \$100 for completing the randomized trial, but no compensation was offered for the baseline survey.

Data collection

Validated instruments assessed burnout and well-being, including the abbreviated Maslach Burnout Inventory (evaluating three domains of burnout - emotional exhaustion, depersonalization, and personal accomplishment),²² Perceived Stress Scale,²³ Flourishing Index,¹³ Brief Resilience Scale,²⁴ PROMIS Sleep Disturbance,²⁵ NIH Toolbox Loneliness,²⁶ PROMIS Meaning and Purpose,²⁷ and General Self-Efficacy Scale.²⁸ Administered electronically via REDCap,²⁹ the survey collected demographic data on gender, race, ethnicity, specialty, training level, relationship status, geography, and survey completion time. The survey was developed for this study (Supplementary Digital Appendix, eMethods 1). The study was approved by the UW-Madison Institutional Review Board as minimal risk. Participation was voluntary with electronic informed consent obtained.

Data analysis

We summarized participant demographics and calculated burnout and well-being prevalence rates for measures with established thresholds. Specialties were grouped into medicine (emergency, family, and internal medicine) and surgery (general, subspecialties, and obstetrics-gynecology). Training level was compared across specialty by intern (post-graduate year [PGY]-1), mid-level (medicine PGY-2, surgery PGY-2-3) and senior (medicine PGY-3+, surgery PGY-4+). Race categories

with small numbers (multiracial, American-Indian/Alaskan Native, and Native Hawaiian/Pacific Islander) were grouped as Multiracial/Other, and ethnicity as Hispanic/Latino vs. non-Hispanic/Latino.

We applied multivariable, fixed-effects linear regression to examine associations between demographics and well-being outcomes, adjusting for gender, race/ethnicity, specialty, training level, relationship status, geography, and seasonality. With <5% missing data, we applied pairwise deletion.³⁰ Skewness and kurtosis of continuous variables to assess normality were within recommended thresholds (skewness<2, kurtosis<7).³¹ For binary outcomes, we used multivariable logistic regression. Interaction terms between gender and race assessed gender outcome variation across racial groups. We reported standardized coefficients for linear models and odds ratios (ORs) with 95% confidence intervals (CIs) for logistic models. We set statistical significance at $p<.05$. Given the study's exploratory nature and large number of tests conducted, we report unadjusted p -values and with Bonferroni correction applied for 10 outcomes (i.e., $p_{\text{corrected}}=.005$). Analysis was conducted in R (v4.4.0).³²

Results

The study included 540 participants, after 195 screened ineligible due to not being in a target specialty (132), regularly meditating (163), or previously using the app (156, not mutually exclusive, Supplementary Digital Appendix, eMethods 1).

Response rate could not be accurately estimated based on recruitment methods.

Among participants, 66.8% identified as cisgender women, 31.5% as cisgender men, and 1.7% transgender/non-binary, with a higher proportion of women

compared to ACGME Resident Data 2022-2023 of the same specialties (47.2% female, 52.5% male, 0.3% non-binary/not reported).³³

Regarding race and ethnicity, 67.0% identified as White, 21.1% Asian, 5.3% Black, 6.6% Multiracial/Other, and 7.0% Hispanic. This cohort had more White and non-Hispanic residents compared to ACGME data (52.8% White, 29.0% Asian, 7.3% Black, 8.6% Multiracial/Other, 9.8% Hispanic).³³

For specialties, 56.1% were in medicine and 43.9% were in a surgical specialty (Table 1), compared to ACGME data (66.2% medicine, 33.8% surgical).³³

Perceived Stress

Overall, 68% of residents reported elevated stress with a mean score of 16.87 (SD 6.79; Table 2). In linear models, all of which adjusted for demographic variables, cisgender women had significantly higher stress than cisgender men ($\beta=0.27$, $p<.01$, Supplementary Digital Appendix, eTable 3). In logistic models, all of which adjusted for demographic variables, mid-level residents had 1.72 times higher odds of elevated stressed than interns (OR=1.72, CI 1.08-2.74, Supplementary Digital Appendix, eTable 4). Race and gender did not interact in predicting stress in linear or logistic models (Supplementary Digital Appendix, eTables 5-6).

Burnout

Overall, 82% of residents met thresholds for emotional exhaustion burnout (Table 2). In linear models, mid-level residents ($\beta=0.24$, $p<.05$) had higher emotional exhaustion than (eTable 3). In logistic models, Northeast residents had 2.56 times higher odds of emotional exhaustion burnout (OR=2.56, 1.15-5.67, eTable 4). Race

and gender did not interact in predicting emotional exhaustion in linear or logistic models (eTables 5-6).

For burnout on the depersonalization scale, 70% overall met thresholds for depersonalization burnout (Table 2). In linear models, surgical specialties ($\beta=0.28$, $p<.01$) and mid-level residents ($\beta=0.35$, $p<.01$) had higher depersonalization than medicine specialties and interns, respectively. Cisgender women ($\beta=-0.25$, $p<.01$) and Black residents ($\beta=-0.61$, $p<.01$) had lower depersonalization compared to cisgender men and White residents, respectively (eTable 3). In logistic models, respondents in the winter had three times higher odds of having depersonalization burnout (OR=3.01, CI 1.12-8.05) compared to the spring (eTable 4). Race and gender did not interact in predicting depersonalization in linear or logistic models (eTables 5-6).

For burnout on the personal accomplishment scale, 49% of respondents had elevated levels of burnout (Table 2). In linear models, surgical specialties ($\beta=0.20$, $p<.05$) had higher lack of personal accomplishment (eTable 3). In logistic models, respondents in the summer had 0.49 times lower odds of personal accomplishment burnout (OR=0.51, CI 0.27-0.96, eTable 4). Race and gender did not interact in predicting personal accomplishment burnout in linear or logistic models (eTables 5-6).

Loneliness

Overall, 92% of respondents had elevated loneliness (Table 2). In linear models, cisgender women ($\beta=0.24$, $p<.05$), Multiracial/Other residents ($\beta=0.37$, $p<.05$) and single residents ($\beta=0.34$, $p<.001$) were significantly lonelier (eTable 3). There were no significant differences in logistic models (eTable 4). A significant

interaction between gender and race was observed for Black residents, where cisgender women had lower loneliness scores compared to cisgender men ($p < .05$) in linear models (eTable 5). Race and gender did not interact in predicting loneliness in logistic models (eTable 6).

Sleep Disturbance

Overall, 13% of respondents reported elevated sleep disturbance (Table 2). In linear models, Hispanic ($\beta = 0.42$, $p < .05$) and single residents ($\beta = 0.20$, $p < .05$) had significantly higher sleep disturbance (eTable 3). In logistic models, Hispanic residents had 2.77 times higher odds (OR=2.77, CI 1.14-6.72), single residents had 1.87 times higher odds (OR=1.87, CI 1.06-3.30), and Northeast residents had over two times higher odds (OR=2.16, CI 1.03-4.55) of sleep disturbance (eTable 4). A significant interaction between gender and race was observed for Asian residents, where transgender or nonbinary residents had significantly less sleep disturbance compared to cisgender men ($p < .05$) in linear models (eTable 5). Race and gender did not interact in predicting sleep in logistic models (eTable 6).

Resilience

Overall, 25% of residents had low resilience (Table 3). In linear models, cisgender women ($\beta = -0.35$, $p < .001$) had lower resilience (eTable 3). In logistic models, women had 2.18 times higher odds of low resilience (OR=2.18, CI 1.30-3.66) and surgical specialties had 0.39 lower odds of low resilience (OR=0.61, CI 0.38-0.96, eTable 4). Race and gender did not interact in predicting resilience in linear or logistic models (eTables 5-6).

Flourishing

Overall, residents had a mean of 6.66 (SD 1.44) on the Flourishing Index¹³ (Table 3). In linear models, women ($\beta=-0.27$, $p<.01$), mid-level residents ($\beta=-0.26$, $p<.05$) and single residents ($\beta=-0.21$, $p<.05$) had lower flourishing scores (eTable 3). Logistic models were not calculated as the measure does not have established cutoffs. Race and gender did not interact in predicting flourishing in linear models (eTables 5-6).

Meaning and Purpose

Overall, 18% of respondents reported elevated meaning and purpose (Table 3). In linear models, cisgender women ($\beta=-0.24$, $p<.05$), transgender and non-binary ($\beta=-0.84$, $p<.05$), mid-level residents ($\beta=-0.29$, $p<.01$), and single residents ($\beta=-0.32$, $p<.01$) had significantly lower meaning and purpose (eTable 3). In logistic models, cisgender women had 0.44 lower odds (OR=0.56, CI 0.34-0.93), mid-level residents had 0.48 lower odds (OR=0.52, CI 0.29-0.92), and single residents had 0.54 lower odds of elevated meaning and purpose (OR=0.47, CI 0.26-0.88, eTable 4). Race and gender did not interact in predicting meaning and purpose in linear or logistic models (eTables 5-6).

Self-Efficacy

Overall, residents had a mean of 31.89 (SD=3.73) on the General Self-Efficacy Scale²⁸ (Table 3). In linear models, surgical ($\beta=0.28$, $p<.01$), senior ($\beta=0.30$, $p<.05$), and Hispanic residents ($\beta=0.42$, $p<.05$) had higher self-efficacy. Cisgender women ($\beta=-0.30$, $p<.01$) and Multi-racial/Other residents ($\beta=-0.39$, $p<.05$) had lower self-efficacy (eTable 3). Logistic models were not calculated as the General Self-Efficacy Scale does not have established cutoffs. Race and gender did not interact in predicting self-efficacy in linear models (eTables 5-6).

P-value Correction

Using a Bonferroni-corrected $p_{\text{corrected}}=.005$, the following associations remained statistically significant for linear models: women had lower resilience, flourishing, and self-efficacy; Black residents had lower depersonalization; surgery residents had higher depersonalization and self-efficacy; single residents had higher loneliness and lower meaning and purpose (eTable 3). For logistic models, women having over two times higher odds of low resilience remained significant (eTable 4).

Discussion

Stress, burnout and well-being of residents on the front lines are concerning and may have worsened post-pandemic. In our study, residents had higher rates of elevated stress (68% vs. 58%)³⁴ and burnout (82%) compared to pre-pandemic (40-69%)^{34,35} and even pandemic ranges (26-76%)³⁶ with significant demographic disparities. The finding of 82% resident burnout rate was higher in comparison to the general population (35.2%)²¹ and nursing populations (35.3%).³⁷ Also, almost all residents (92%) had elevated loneliness, which is linked to resident burnout³⁸ as well as significant physical and mental health risk.³⁹ This exceeds the approximately 50% prevalence of loneliness reported among the general population.³⁹ The persistence and evidence of worsening stress, burnout, and well-being in residents suggests that current well-being support strategies in graduate medical education are insufficient and there is still a need for effective interventions and systemic changes.

Demographic Disparities

Gender disparities were found in almost all outcomes. Compared to men, cisgender women reported higher stress and loneliness with lower resilience, flourishing, meaning and purpose, and self-efficacy with small effect sizes.⁴⁰ They were over twice as likely to have low resilience, and several disparities remained significant after Bonferroni correction. Our findings mirror pre- and pandemic-era studies where women exhibited higher burnout and worse well-being,⁴¹⁻⁴³ potentially due to negative workplace interactions,⁴³ discrimination, harassment,⁴¹ and higher depression and anxiety rates.⁴⁴

Transgender and nonbinary residents reported significantly lower meaning and purpose with a large effect size.⁴⁰ Though sample size limited statistical power for other outcomes, this group often reported the numerically highest distress and lowest well-being (Tables 2-3). Prior studies often treat gender as binary and gender minorities may not disclose gender due to discrimination.^{45,46} Cultivating resilience and meaning and purpose during training may be particularly important for women and gender minorities.

Single residents were lonelier, more sleep disturbed, and had lower flourishing and meaning and purpose compared to residents in long-term relationships. Single relationship status has been associated with loneliness,⁴⁷ and less social support can exacerbate burnout.⁴⁸ Furthermore, single residents may struggle with work-life boundaries, which could worsen sleep. Future research is needed to assess broader social networks, including friends, family, and colleagues, as well as the role of pregnancy and child-raising.

Black residents and cisgender women had lower burnout from depersonalization, which assesses cynicism and indifference towards work and patients.³⁴ This

contradicts evidence linking burnout to discrimination among racial minorities and women.^{49,50} However, literature on racial burnout disparities is mixed.^{51,52} Our findings may reflect stronger patient-centered attitudes in groups with lower depersonalization. This could indicate a higher emotional burden, where increased empathy distress may affect well-being.

Unlike cisgender women, mid-level residents showed higher depersonalization burnout and worse well-being – higher stress and emotional exhaustion, lower flourishing, meaning and purpose, and self-efficacy – compared to interns with small effect sizes. Pre-pandemic studies show mixed results on burnout and training level.⁵³ Our findings reveal a critical training phase where expectations and responsibilities increase while autonomy or accomplishment remain limited. Greater attention to well-being during this “in-between” phase of training is needed.

Geography and Seasonality

Environmental factors also play a role. Residents had three times higher odds of burnout from depersonalization in winter, similar to findings of an intern study,⁵⁴ which may reflect seasonal mood effects. Higher personal accomplishment in summer may stem from increased responsibility and autonomy when progressing to the next postgraduate year.

Northeast residents had over twice the odds of emotional exhaustion and sleep disturbance, differing from past studies showing no geographic differences⁵⁵ or higher burnout in the Midwest.⁵³ Regional program differences (e.g., working more hours)⁵⁶ may explain this pattern. However, programmatic differences in the

balance of clinical duties and education in residency, which may have affected observed outcomes, were unable to be assessed, and this warrants further study.

Recognizing Heterogeneity

The heterogeneity of outcomes by demographics joins growing literature that burnout is not experienced uniformly across individual characteristics,^{43,54,57} highlighting a nuanced relationship between demographics, residency characteristics and well-being. Thus, policies and interventions need to move beyond one-size-fits-all approaches and incorporate tailored solutions addressing the specific challenges faced by intersecting identities.

Furthermore, our findings highlight the complexity of burnout and well-being, which span emotional, psychological, and social domains at individual, cultural, and systemic levels. It is important to move beyond a unidimensional understanding of burnout; many studies often combine subscales (i.e., emotional exhaustion and depersonalization) or solely rely on one subscale.^{58,59} Our study shows that unidimensional burnout measures and lack of assessment of well-being may mask demographic differences and nuances. Effective interventions must recognize and address these variations to support high-risk groups. Further research is needed to understand the mechanisms driving these patterns.

Limitations

This study had several limitations. First, as part of a well-being randomized trial, the survey excluded potential participants, and so was prone to selection bias that could skew results to overly optimistic (e.g., individuals who feel they have bandwidth to join a study may have higher well-being) or overly pessimistic portrayal (e.g., individuals who feel a need to improve their well-being may be

more likely to participate). Second, the study sample was not probability-based which limits generalizability of the results. Conservatively assuming all eligible U.S. residents were reached, the estimated response rate would be approximately 0.64%. However, the survey invite was sent to a small fraction of US residency programs, and the response rate cannot accurately be estimated due to snowball recruitment methods. This recruitment strategy enabled widespread dissemination across multiple institutions and demographic groups, and the final sample included residents with demographic and training characteristics similar to national ACGME distributions of U.S. residents.³³ Third, although the study collected data across multiple seasons and controlled for seasonality, seasonal variation may still contribute to fluctuation in well-being and represents a potential confound to the results. Future studies examining well-being trends should incorporate sampling over the full calendar year to better account for seasonal effects. Finally, the cross-sectional design prohibits causal inferences, and self-report measures may introduce response bias.

Conclusion

This study presents concerning trends of worsening stress, burnout, and well-being post-pandemic among resident physicians, and certain demographic groups may be at higher risk. Our findings underscore the critical need for targeted well-being interventions in residency.

Declarations

Abbreviations

ACGME = Accreditation Council for Graduate Medical Education

COVID-19 = Corona Virus Disease of 2019

UW-Madison = University of Wisconsin-Madison

OR = Odds Ratio

CI = Confidence Interval

Ethics Approval and consent to participate

The study was reviewed by the Minimal Risk Research Institutional Review Board at University of Wisconsin-Madison and determined to pose minimal risk to participants on 11/20/2023 (ID: 2023-1432). All procedures involving human participants were performed in accordance with the ethical standards of the Declaration of Helsinki. Participation was voluntary with electronic informed consent obtained.

Consent for publication

Not applicable

Availability of data and materials

De-identified data available upon request from corresponding author.

Competing Interests

None

Funding/Support

This study was supported by the University of Wisconsin Primary Care Research Fellowship, funded by grant T32HP10010 from the Health Resources and Services Administration, the A.R. Curreri Distinguished Chair and Professorship at University of Wisconsin-Madison, and The Center for Healthy Minds Center Director Fund. SBG was partially supported by the National Center for Complementary & Integrative Health of the National Institutes of Health under Award Number K23AT010879.

Other Disclosures

Richard Davidson is the Founder and Chief Visionary of Healthy Minds Innovations, a non-profit corporation from which he receives no compensation.

Authors' contributions

ST contributed to the conceptualization, methodology, analysis, investigation, writing - original draft, project administration, and visualization.

HS and BP contributed to the investigation, project administration, and writing - original draft.

SM and LC contributed to the visualization and project administration.

NI contributed to the formal analysis and investigation.

DE, VM, BB, and RD contributed to the conceptualization, methodology, writing - review and editing, and supervision.

SG contributed to the conceptualization, methodology, formal analysis, writing - review and editing, and supervision.

Acknowledgements

None

References

1. IsHak WW, Lederer S, Mandili C, et al. Burnout During Residency Training: A Literature Review. *J Grad Med Educ*. 2009;1(2):236-242. doi:10.4300/JGME-D-09-00054.1
2. Lebares CC, Guvva EV, Ascher NL, O'Sullivan PS, Harris HW, Epel ES. Burnout and Stress Among US Surgery Residents: Psychological Distress and Resilience. *J Am Coll Surg*. 2018;226(1):80-90. doi:10.1016/j.jamcollsurg.2017.10.010
3. Maslach C, Jackson SE, Leiter MP. Maslach Burnout Inventory: Third edition. In: *Evaluating Stress: A Book of Resources*. Scarecrow Education; 1997:191-218.
4. Thomas NK. Resident Burnout. *JAMA*. 2004;292(23):2880-2889. doi:10.1001/jama.292.23.2880
5. Hojat M, Vergare MJ, Maxwell K, et al. The Devil is in the Third Year: A Longitudinal Study of Erosion of Empathy in Medical School: *Acad Med*. 2009;84(9):1182-1191. doi:10.1097/ACM.0b013e3181b17e55
6. Ferreira S, Afonso P, Ramos M do R. Empathy and burnout: A multicentre comparative study between residents and specialists. *J Eval Clin Pract*. 2020;26(1):216-222. doi:10.1111/jep.13147
7. Dyrbye LN, West CP, Satele D, et al. Burnout Among U.S. Medical Students, Residents, and Early Career Physicians Relative to the General U.S. Population. *Acad Med*. 2014;89(3):443. doi:10.1097/ACM.000000000000134
8. Rodrigues H, Cobucci R, Oliveira A, et al. Burnout syndrome among medical residents: A systematic review and meta-analysis. Junne FP, ed. *PLOS ONE*. 2018;13(11):e0206840. doi:10.1371/journal.pone.0206840
9. Maintaining the Fire but Avoiding Burnout: Implementation and Evaluation of a Resident Well-Being Program - ScienceDirect. Accessed June 27, 2024. https://www.sciencedirect.com/science/article/pii/S1072751517321804?casa_token=en=E9N-wk_P5PkAAAAA:sYryDWckFf85j9BjsO4e6wVixqPuap8HZsIIZM6qpuchh1ZIIucpeuQ9rfo0Fvdl9M-aYP1gwqQ_
10. Yates SW. Physician Stress and Burnout. *Am J Med*. 2020;133(2):160-164. doi:10.1016/j.amjmed.2019.08.034

11. Fahrenkopf AM, Sectish TC, Barger LK, et al. Rates of medication errors among depressed and burnt out residents: prospective cohort study. *BMJ*. 2008;336(7642):488-491. doi:10.1136/bmj.39469.763218.BE
12. Bryan Bohman, MD, Liselotte Dyrbye, MD, MHPE, Christine A. Sinsky, MD, et al. Physician Well-Being: The Reciprocity of Practice Efficiency, Culture of Wellness, and Personal Resilience. *Catal Carryover*. 2017;3(4). doi:10.1056/CAT.17.0429
13. VanderWeele TJ. On the promotion of human flourishing. *Proc Natl Acad Sci*. 2017;114(31):8148-8156. doi:10.1073/pnas.1702996114
14. Sullivan AG, Hoffman A, Slavin S. Becoming AWARE: ACGME's New Suite of Well-Being Resources. *J Grad Med Educ*. 2020;12(1):122-124. doi:10.4300/JGME-D-19-00967.1
15. Raj KS. Well-Being in Residency: A Systematic Review. *J Grad Med Educ*. 2016;8(5):674-684. doi:10.4300/JGME-D-15-00764.1
16. Kelly-Hedrick M, Rodriguez MM, Ruble AE, Wright SM, Chisolm MS. Measuring Flourishing Among Internal Medicine and Psychiatry Residents. *J Grad Med Educ*. 2020;12(3):312-319. doi:10.4300/JGME-D-19-00793.1
17. Shanafelt TD, Boone S, Tan L, et al. Burnout and Satisfaction With Work-Life Balance Among US Physicians Relative to the General US Population. *Arch Intern Med*. 2012;172(18):1377-1385. doi:10.1001/archinternmed.2012.3199
18. Levels and drivers of burnout during the COVID-19 pandemic among a diverse group of resident physicians.
19. Chen SY, Lo HY, Hung SK. What is the impact of the COVID-19 pandemic on residency training: a systematic review and analysis. *BMC Med Educ*. 2021;21:618. doi:10.1186/s12909-021-03041-8
20. TABATABAI S. COVID-19 impact and virtual medical education. *J Adv Med Educ Prof*. 2020;8(3):140-143. doi:10.30476/jamp.2020.86070.1213
21. Shanafelt TD, Boone S, Tan L, et al. Burnout and Satisfaction With Work-Life Balance Among US Physicians Relative to the General US Population. *Arch Intern Med*. 2012;172(18):1377-1385. doi:10.1001/archinternmed.2012.3199
22. Maslach C, Jackson SE, Leiter MP. Maslach Burnout Inventory: Third edition. In: *Evaluating Stress: A Book of Resources*. Scarecrow Education; 1997:191-218.
23. Cohen S, Kamarck T, Mermelstein R. A Global Measure of Perceived Stress. *J Health Soc Behav*. 1983;24(4):385-396. doi:10.2307/2136404
24. Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The brief resilience scale: assessing the ability to bounce back. *Int J Behav Med*. 2008;15(3):194-200. doi:10.1080/10705500802222972

25. Yu L, Buysse DJ, Germain A, et al. Development of Short Forms from the PROMIS Sleep Disturbance and Sleep-Related Impairment Item Banks. *Behav Sleep Med*. 2011;10(1):6-24. doi:10.1080/15402002.2012.636266
26. Cyranowski JM, Zill N, Bode R, et al. Assessing Social Support, Companionship, and Distress: NIH Toolbox Adult Social Relationship Scales. *Health Psychol Off J Div Health Psychol Am Psychol Assoc*. 2013;32(3):293-301. doi:10.1037/a0028586
27. Salsman JM, Schalet BD, Park CL, et al. Assessing meaning & purpose in life: development and validation of an item bank and short forms for the NIH PROMIS®. *Qual Life Res*. 2020;29(8):2299-2310. doi:10.1007/s11136-020-02489-3
28. Schwarzer R, Jerusalem M. General Self-Efficacy Scale. Published online January 9, 2012. doi:10.1037/t00393-000
29. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009;42(2):377-381. doi:10.1016/j.jbi.2008.08.010
30. Graham JW. Missing data analysis: making it work in the real world. *Annu Rev Psychol*. 2009;60:549-576. doi:10.1146/annurev.psych.58.110405.085530
31. West SG, Finch JF, Curran PJ. Structural equation models with nonnormal variables: Problems and remedies. In: *Structural Equation Modeling: Concepts, Issues, and Applications*. Sage Publications, Inc; 1995:56-75.
32. R Core Team (2024). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>.
33. ACGME Data Resource Book. Accessed December 10, 2024. <https://www.acgme.org/about/publications-and-resources/graduate-medical-education-data-resource-book/>
34. Lebares CC, Guvva EV, Ascher NL, O'Sullivan PS, Harris HW, Epel ES. Burnout and Stress Among US Surgery Residents: Psychological Distress and Resilience. *J Am Coll Surg*. 2018;226(1):80-90. doi:10.1016/j.jamcollsurg.2017.10.010
35. Dyrbye LN, West CP, Satele D, et al. Burnout Among U.S. Medical Students, Residents, and Early Career Physicians Relative to the General U.S. Population. *Acad Med*. 2014;89(3):443. doi:10.1097/ACM.000000000000134
36. Navinés R, Olivé V, Fonseca F, Martín-Santos R. Work stress and resident burnout, before and during the COVID-19 pandemic: An up-date. *Med Clínica Engl Ed*. 2021;157(3):130-140. doi:10.1016/j.medcle.2021.04.005

37. Dyrbye LN, Shanafelt TD, Johnson PO, Johnson LA, Satele D, West CP. A cross-sectional study exploring the relationship between burnout, absenteeism, and job performance among American nurses. *BMC Nurs.* 2019;18(1):57. doi:10.1186/s12912-019-0382-7
38. Shapiro J, Zhang B, Warm EJ. Residency as a Social Network: Burnout, Loneliness, and Social Network Centrality. *J Grad Med Educ.* 2015;7(4):617-623. doi:10.4300/JGME-D-15-00038.1
39. Office of the Surgeon General (OSG). *Our Epidemic of Loneliness and Isolation: The U.S. Surgeon General's Advisory on the Healing Effects of Social Connection and Community.* US Department of Health and Human Services; 2023. Accessed December 20, 2024. <http://www.ncbi.nlm.nih.gov/books/NBK595227/>
40. Cohen J. Statistical Power Analysis. *Curr Dir Psychol Sci.* 1992;1(3):98-101. doi:10.1111/1467-8721.ep10768783
41. Hu YY, Ellis RJ, Hewitt DB, et al. Discrimination, Abuse, Harassment, and Burnout in Surgical Residency Training. *N Engl J Med.* 2019;381(18):1741-1752. doi:10.1056/NEJMsa1903759
42. Zoorob D, Shah S, Saevig DL, Murphy C, Aouthmany S, Brickman K. Insight into resident burnout, mental wellness, and coping mechanisms early in the COVID-19 pandemic. *PLOS ONE.* 2021;16(4):e0250104. doi:10.1371/journal.pone.0250104
43. Dyrbye LN, West CP, Herrin J, et al. A Longitudinal Study Exploring Learning Environment Culture and Subsequent Risk of Burnout Among Resident Physicians Overall and by Gender. *Mayo Clin Proc.* 2021;96(8):2168-2183. doi:10.1016/j.mayocp.2020.12.036
44. Leach LS, Christensen H, Mackinnon AJ, Windsor TD, Butterworth P. Gender differences in depression and anxiety across the adult lifespan: the role of psychosocial mediators. *Soc Psychiatry Psychiatr Epidemiol.* 2008;43(12):983-998. doi:10.1007/s00127-008-0388-z
45. Dimant OE, Cook TE, Greene RE, Radix AE. Experiences of Transgender and Gender Nonbinary Medical Students and Physicians. *Transgender Health.* 2019;4(1):209-216. doi:10.1089/trgh.2019.0021
46. Mansh M, White W, Gee-Tong L, et al. Sexual and Gender Minority Identity Disclosure During Undergraduate Medical Education: "In the Closet" in Medical School. *Acad Med.* 2015;90(5):634. doi:10.1097/ACM.0000000000000657
47. Adamczyk K. An Investigation of Loneliness and Perceived Social Support Among Single and Partnered Young Adults. *Curr Psychol.* 2016;35(4):674-689. doi:10.1007/s12144-015-9337-7

48. Eckleberry-Hunt J, Lick D, Boura J, et al. An Exploratory Study of Resident Burnout and Wellness. *Acad Med*. 2009;84(2):269. doi:10.1097/ACM.0b013e3181938a45
49. Dyrbye LN, West CP, Sinsky CA, et al. Physicians' Experiences With Mistreatment and Discrimination by Patients, Families, and Visitors and Association With Burnout. *JAMA Netw Open*. 2022;5(5):e2213080. doi:10.1001/jamanetworkopen.2022.13080
50. Teke ME, Taveras LR, Meier J, et al. Burnout in Surgical Residents of Underrepresented in Medicine Backgrounds: Key Influencing Factors and Possible Solutions. *J Surg Res*. 2023;291:51-57. doi:10.1016/j.jss.2023.05.022
51. Doe S, Coutinho A, Weidner A, et al. Prevalence and Predictors of Burnout Among Resident Family Physicians. *Fam Med*. 56(3):148-155. doi:10.22454/FamMed.2024.875388
52. Garcia LC, Shanafelt TD, West CP, et al. Burnout, Depression, Career Satisfaction, and Work-Life Integration by Physician Race/Ethnicity. *JAMA Netw Open*. 2020;3(8):e2012762. doi:10.1001/jamanetworkopen.2020.12762
53. Nituica C, Bota OA, Blebea J, Cheng CI, Slotman GJ. Factors influencing resilience and burnout among resident physicians - a National Survey. *BMC Med Educ*. 2021;21(1):514. doi:10.1186/s12909-021-02950-y
54. Doolittle BR, Windish DM. Correlation of burnout syndrome with specific coping strategies, behaviors, and spiritual attitudes among interns at Yale University, New Haven, USA. *J Educ Eval Health Prof*. 2015;12. doi:10.3352/jeehp.2015.12.41
55. Elmore LC, Jeffe DB, Jin L, Awad MM, Turnbull IR. National Survey of Burnout among US General Surgery Residents. *J Am Coll Surg*. 2016;223(3):440-451. doi:10.1016/j.jamcollsurg.2016.05.014
56. Ellis RJ, Hewitt DB, Hu YY, et al. An Empirical National Assessment of the Learning Environment and Factors Associated With Program Culture. *Ann Surg*. 2019;270(4):585. doi:10.1097/SLA.0000000000003545
57. Gleichgerrcht E, Decety J. Empathy in Clinical Practice: How Individual Dispositions, Gender, and Experience Moderate Empathic Concern, Burnout, and Emotional Distress in Physicians. *PLOS ONE*. 2013;8(4):e61526. doi:10.1371/journal.pone.0061526
58. Maslach C, Leiter MP, Schaufeli W. Measuring Burnout. In: Cartwright S, Cooper CL, eds. *The Oxford Handbook of Organizational Well Being*. Oxford University Press; 2008:0. doi:10.1093/oxfordhb/9780199211913.003.0005
59. West CP, Dyrbye LN, Satele DV, Sloan JA, Shanafelt TD. Concurrent Validity of Single-Item Measures of Emotional Exhaustion and Depersonalization in Burnout Assessment. *J Gen Intern Med*. 2012;27(11):1445-1452. doi:10.1007/s11606-012-2015-7

ARTICLE IN PRESS

Table 1: Demographic Characteristics

Demographic	Overall n (%), Total N = 540
Medicine Specialty	303 (56.1)
Emergency Medicine	39 (7.2)
Family Medicine	155 (28.7)
Internal Medicine	109 (20.2)
Surgery Specialty	237 (43.9)
Cardiothoracic	4 (0.7)
General	87 (16.1)
Neurosurgery	4 (0.7)
Obstetrics and Gynecology	71 (13.1)
Ophthalmology	3 (0.6)
Orthopedic	12 (2.2)
Otolaryngology	21 (3.9)
Plastics	18 (3.3)
Urology	11 (2.0)
Vascular	6 (1.1)
Gender	
Cisgender Man	168 (31.5)
Cisgender Woman	356 (66.8)
Transgender/Non-binary	9 (1.7)
NA	7 (1.3)
Level of Training	
Intern	179 (33.3)
Mid-Level Resident	225 (41.9)
Senior Resident	133 (24.8)
NA	3 (0.6)
Race/Ethnicity	
White	355 (67.0)
Asian	112 (21.1)
Black	28 (5.3)
Multiracial/Other	35 (6.6)
Hispanic	37 (7.0)
NA	10 (1.9)
Relationship Status	
Single	157 (29.2)
Married/Long-term Relationship	380 (70.8)
NA	3 (0.6)
Geography	
Northeast	102 (19.4)
Midwest	182 (34.5)
South	148 (28.1)
West	95 (18.0)
NA	13 (2.4)
Season	
Spring	440 (81.5)
Summer	57 (10.6)

Winter	43 (8.0)
--------	----------

Abbreviations: NA = not reported.

ARTICLE IN PRESS

Table 2: Negative Well-being Outcomes Overall and by Demographics

Variable	Overall (n=540)	Medicine Specialty (n=303)	Surgical Specialty (n=237)	Cis Women (n=356)	Cis Men (168)	Transgender/ Nonbinary (n=9)	White (n=355)	Asian (n=112)	Black (n=28)	Multiracial/Other (n=35)	Hispanic (n=37)
Stress Mean (SD)	16.87 (6.79)	16.89 (6.61)	16.85 (7.04)	17.63 (7.00)	15.28 (6.01)	19.78 (8.47)	17.07 (6.94)	16.77 (6.86)	15.71 (6.19)	16.89 (5.53)	17.00 (8.09)
% Elevated	67.96	67.33	68.78	71.35	60.71	88.89	67.89	73.21	57.14	65.71	59.46
Burnout EE Mean (SD)	10.86 (4.27)	10.66 (4.31)	11.11 (4.20)	11.24 (4.19)	10.03 (4.34)	12.67 (4.00)	11.06 (4.30)	10.45 (4.34)	10.64 (3.88)	10.77 (3.79)	10.41 (4.54)
% Elevated	82.41	81.19	83.97	84.27	78.57	88.89	83.10	79.46	82.14	91.43	78.38
Burnout DP Mean (SD)	6.55 (4.36)	5.84 (4.22)	7.46 (4.38)	6.36 (4.21)	7.15 (4.67)	4.67 (4.06)	6.74 (4.31)	6.79 (4.61)	4.18 (2.92)	6.23 (4.54)	5.49 (4.29)
% Elevated	70.37	66.01	75.95	71.07	70.83	44.44	71.83	74.11	53.57	62.86	62.16
Burnout PA Mean (SD)	14.08 (2.66)	13.87 (2.86)	14.34 (2.37)	13.98 (2.69)	14.33 (2.52)	13.33 (4.15)	14.15 (2.57)	13.94 (2.86)	14.00 (3.15)	13.74 (2.64)	13.84 (2.86)
% Elevated	48.52	51.16	45.15	49.16	47.02	44.44	47.04	53.57	50.00	48.57	48.65
Loneliness Mean (SD)	2.52 (0.92)	3.39 (0.77)	3.55 (0.76)	3.36 (0.78)	3.70 (0.68)	2.98 (0.95)	3.47 (0.78)	3.38 (0.77)	3.50 (0.72)	3.39 (0.67)	3.48 (0.84)

Meaning and Purpose Mean (SD)	50.39 (9.71)	50.33 (9.88)	50.47 (9.51)	49.40 (9.31)	52.79 (9.86)	41.19 (12.27)	50.63 (9.65)	49.69 (9.80)	50.99 (8.69)	48.99 (10.11)	49.64 (10.91)
% Elevated	17.96	19.47	16.03	14.61	26.19	<0.01	17.75	17.86	21.43	11.43	18.92
Self-Efficacy Mean (SD)^a	31.39 (3.73)	30.93 (3.59)	31.97 (3.82)	31.02 (3.70)	32.28 (3.64)	28.47 (4.14)	31.61 (3.66)	30.68 (3.94)	31.55 (2.65)	30.86 (4.14)	32.14 (4.84)

Table 3: Positive Well-being Outcomes Overall and by Demographics

Abbreviations: Cis = cisgender, NA=Not applicable.

- a. The Flourishing Index and General Self-Efficacy Scale do not have established cutoffs.
- b. All outcomes and prevalence rates across individual, residency, and environmental characteristics re available in Supplementary Digital Appendix.