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Do Mindfulness and Self-Compassion Predict Burnout in Pediatric Residents?

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The forty-six participating residency programs listed in Supplemental Digital Appendix 1 (available at <http://links.lww.com/ACADMED/A620>) are all members of the Pediatric Resident Burnout-Resilience Study Consortium and participated in one or both years of the study. Each institution had one or more site principal investigator(s) who served as collaborators for this study and this report. They are listed in the Supplemental Digital Appendix by name and with their institution.

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Abstract

Purpose

Burnout symptoms are common among health professionals. Gaps remain in understanding both the stability of burnout and compassion over time and relationships among burnout, self-compassion, stress, and mindfulness in pediatric residents.

Method

The authors conducted a prospective cohort study of residents at 31 U.S. residency programs affiliated with the Pediatric Resident Burnout – Resilience Study Consortium. Residents completed online cross-sectional surveys in spring 2016 and 2017. The authors assessed demographic characteristics and standardized measures of mindfulness, self-compassion, stress, burnout, and confidence in providing compassionate care.

Results

Of 1,108 eligible residents, 872 (79%) completed both surveys. Of these, 72% were women. The prevalence of burnout was 58% and the level of mindfulness was 2.8 in both years; levels of stress (16.4 and 16.2), and self-compassion (37.2 and 37.6) were also nearly identical in both years. After controlling for baseline burnout levels in linear mixed model regression analyses, mindfulness in 2016 was protective for levels of stress and confidence in providing compassionate care in 2017. Self-compassion in 2016 was protective for burnout, stress, and confidence in providing compassionate care in 2017; one standard deviation increase in self-compassion score was associated with a decrease in the probability of burnout from 58% to 48%.

Conclusions

Burnout and stress were prevalent and stable over at least 12 months among pediatric residents; mindfulness and self-compassion were longitudinally associated with lower stress and greater confidence in providing compassionate care. Future studies are needed to evaluate the effectiveness of training that promotes mindfulness and self-compassion in pediatric residents.

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Burnout and stress are now reported by a majority of physicians, including pediatricians.¹⁻³ Burnout is associated with significant personal morbidity (such as substance abuse and suicide), impaired professional behavior (poor communication, higher error rates), and high overall costs to employers and society.⁴⁻⁸ Despite efforts to reduce this distress by regulating duty hours or by offering on-site counseling services, support groups, retreats, and education, rates of burnout and depression continue to rise.^{1,2,9,10} Several professional groups, including the American Academy of Pediatrics (AAP) and the Accreditation Council for Graduate Medical Education (ACGME), have called for more systematic approaches to addressing stress and burnout, including the development of wellness and resilience curricula.¹¹⁻¹³ These systematic approaches require solid evidence about the epidemiology of burnout, the risk of experiencing it, and factors amenable to change that protect against it.

Previous research suggests that demographic characteristics and personal experiences are associated with burnout. For example, burnout rates are reportedly higher among women, among those undergoing overnight call rotations, and among those with higher personal debt.¹⁴⁻¹⁹ Some factors may also help protect residents from burnout. These “protective factors” include having training in mind-body skills and having higher scores on standard measures of mindfulness and self-compassion.²⁰⁻²⁵ For the most part, these studies have been conducted at single institutions and are cross-sectional. One uncontrolled, prospective cohort study of palliative care clinicians reported that a curriculum emphasizing mindfulness, lovingkindness, and compassion was associated with greater self-care and less distress and burnout.²⁶ Similarly, other uncontrolled studies of diverse health professionals who received online training in mind-body skills have found significant improvements in mindfulness, self-compassion, stress, burnout, and confidence in providing compassionate care to patients.²⁷⁻²⁹ (Self-compassion entails treating oneself with

kindness, recognizing one's shared humanity, and being mindful when considering negative aspects of oneself.³⁰) Two studies have shown that mindfulness-based interventions that promote non-judgmental awareness of whatever is happening in the present moment may increase self-compassion in health professionals and the general population,^{31,32} and single-institution studies have indicated that self-compassion may be protective against burnout.^{33,34} Gaps remain in understanding the most effective strategies for teaching self-compassion or the sustainability of its protective effects on burnout. We have been unable to find large prospective studies that have evaluated the protective effects of mindfulness and self-compassion on stress and burnout scores after controlling for baseline burnout and stress levels in a national sample of pediatric residents. We aimed to answer three questions through our nationally representative multi-site prospective longitudinal study:

1. What is the rate of burnout among pediatric residents nationally, and how stable is it over twelve months?
2. What are the levels of stress, confidence in providing compassionate care, mindfulness, and self-compassion in pediatric residents; how stable are these qualities over one year; and how do they correlate with one another and with burnout?
3. After controlling for burnout rates in 2016, are levels of mindfulness and self-compassion in 2016 predictive of stress, burnout, and confidence in providing compassionate care in 2017 among pediatric residents?

We plan to address additional questions about the relationships among burnout, duty hours, special training tracks, and competencies in future studies using existing and ongoing data collected for this longitudinal survey.

We hypothesized that the rate of burnout would be similar to that found in recent studies: that is, approximately 30%-70%.^{3,35-37} We hypothesized that rates of stress on the Perceived Stress Scale would be—as reported in other studies—higher in our study participants than in the general population while levels of mindfulness and self-compassion would be comparable to normative populations. Finally, we hypothesized that after controlling for 2016 levels of burnout, levels of mindfulness and self-compassion in 2016 would be associated with lower scores on stress, burnout, and improved confidence in providing compassionate care in 2017. We planned to use the answers to these questions to develop future evidence-based interventions aimed at decreasing stress and burnout among pediatric residents nationally.

Method

Design

We, the authors, represent the steering committee of the Pediatric Residency Burnout - Resilience Study Consortium (PRB-RSC). The goals of the PRB-RSC are to provide a better understanding of factors related to pediatric resident burnout so as to prevent it.

We conducted an online survey of pediatric residents in the spring of 2016 and in the spring of 2017. We used the Association of Pediatric Program Directors (APPD)-developed and APPD-owned Longitudinal Educational Assessment Research Network (LEARN) online survey tool. APPD LEARN approved the survey for distribution to all members of pediatric programs involved in the PRB-RSC. Membership in the PRB-RSC was voluntary, and members were solicited based on interest expressed at APPD national meetings. The survey was available from April 1, 2016, through May 30, 2016, and again for a similar period in 2017. Each of the participating institutions sent e-mail reminders to non-responders.

Participants

Residents were eligible to participate if they were enrolled in a pediatrics residency, a medicine-pediatrics residency, or a combined residency (e.g., pediatrics-psychiatry, pediatrics-neurology, pediatrics-genetics, pediatrics-anesthesia, or pediatrics-rehabilitation) program at one of the PRB-RSC residency programs in both 2016 (n = 34 programs) and 2017 (n = 46 programs). APPD LEARN assigned unique de-identified identification codes to each resident, but linked their responses to their residency program. APPD LEARN did not give program directors (PDs) any names of participants to ensure participants' anonymity, but did provide information about the number of program respondents. We allowed each participating program to determine whether to offer incentives to residents. We provided a financial award of \$500 to the three programs with the highest completion rates in 2016 only. We designated these award funds for resident wellness activities as determined by each of the three programs. We included participants in the analyses only if they completed the survey instrument in both 2016 and 2017.

Survey instrument

Members of the PRB-RSC developed the survey instrument collaboratively over six months of meetings. We based content on previous research,^{33,38,39} PDs' prior experience, and the goal of creating a manageable, easy-to-complete survey instrument. The final online survey instrument included fewer than 150 questions and required less than 15 minutes to complete. Demographic questions addressed individuals' age, gender, race/ethnicity, marital status, living situation (alone versus with family or non-related others), level of educational debt, current pregnancy status, and parental status.

Primary outcome measures

Burnout. We used the 22-item Maslach Burnout Inventory (MBI), the most widely used measure of burnout in health professionals, to assess burnout.^{40,41} As in previous studies of the prevalence of burnout among medical professionals,^{42,43} we defined burnout as a *dichotomous* variable as having high subscale scores for personal emotional exhaustion (≥ 27) and/or depersonalization (≥ 10). We defined burnout as a *continuous* variable as the total of the emotional exhaustion score plus the depersonalization score. We did not use the continuous variable to determine burnout, as Maslach has cautioned against this; instead, we used this variable to explore associations between burnout and other variables in bivariate and multivariable regression analyses.⁴⁰

Stress. We measured stress with Cohen's 10-item Perceived Stress Scale (PSS), which has been used in multiple studies of health professionals and the general population.⁴⁴⁻⁵⁰ It has good internal reliability and external validity. Scores on the PSS may range from 0 to 40; higher scores indicate higher levels of perceived stress. Scores, which may improve with mindfulness training, range in the general population from 12 to 14, and among health professionals from 14 to 18.⁴⁴⁻⁵⁰

Compassion. We assessed compassion toward patients using the Confidence in Providing Calm, Compassionate Care Scale (CCCS). The CCCS includes 10 items, and potential scores range from 0 to 100 (higher scores indicate greater confidence in ability to provide compassionate care). The CCCS has good internal reliability and correlates in expected directions with standardized measures of mindfulness, empathy, and resilience.⁵¹ Average scores in other studies of health professionals range from 60 to 80.⁵¹

Predictive attributes. We measured two predictive attributes: mindfulness and self-compassion. We assessed *mindfulness* using the 10-item Cognitive and Affective Mindfulness

Scale, Revised (CAMS-R); the CAMS-R has good internal consistency, and scores are significantly correlated with longer measures of mindfulness, well-being, clarity of feelings, adaptive regulation, and cognitive flexibility. Potential item scores range from 1 (low or poor mindfulness) to 4 (high or healthy mindfulness); the average item score in normative populations is 2.8 (standard deviation [SD] = 0.5).⁵²⁻⁵⁴

We measured *self-compassion* using Neff's 12-item measure of self-compassion. Scores may range from 12 (low self-compassion) to 60 (high self-compassion). In normative populations, the average score in normative populations is 36 (SD = 7.3), and the average sub-scale (2-item) score is 5.8 to 6.4.⁵⁵

Because the survey questions were largely basic demographic items and instruments that had been previously validated in earlier research, we did not perform separate validation and pilot testing of the study instrument. Notably, we also asked residents questions about duty hours, as well as about their training track, career satisfaction, health, spirituality, sleeping habits, and empathy. Please contact the authors for a copy of the complete survey.

Statistical analysis

We exported survey data using LimeSurvey (R 3.3.1; LimeSurvey GmbH, Hamburg, Germany) for analysis. We used descriptive statistics to characterize the participants, and we employed binomial tests, Chi Square, t-tests, and analysis of variance (ANOVA) to determine whether characteristics were associated with burnout as appropriate by variable type. We used Spearman rank correlations to calculate correlations among variables. We sought to predict 2017 outcomes (burnout, stress, or confidence providing compassionate care) from 2016 measures of self-compassion and mindfulness using mixed linear regression models (for continuous measures) or logistic regression models (for dichotomous measures), controlling for the following: 2016

outcome, resident year of training, and a random effect of residency program. Demographic factors (e.g., age and gender) that were not statistically associated with burnout in the bivariate analysis were not included in the regression analyses.

Ethical approval

The Nationwide Children's Hospital Institutional Review Board (IRB) approved this study. Each participating program also sought and received local IRB approval, as locally required, using materials supplied by Nationwide Children's Hospital and APPD LEARN.

Results

Of 1,108 potential participants who were post-graduate year (PGY) 1 or PGY 2 residents and completed surveys in 2016, 872 (79%) completed surveys in 2017 as PGY2 or PGY3 residents. These 872 residents were from 31 institutions; see List 1 for the names, and Figure 1 for the geographic distribution of the 31, residency programs participating in both 2016 and 2017 (see Supplemental Digital Appendix 1 at <http://links.lww.com/ACADMED/A620> for a list of all 46 programs participating in 2016 or 2017). Respondents represented programs from across the United States: the east and west coasts, the Midwest, and the south. Respondents in 2017 were significantly more likely than non-respondents to be 1st year residents in 2016 (54% vs. 46%, $P < 0.001$), but we detected no significant differences between 2017 respondents and non-respondents in terms of gender, race, marital status, debt level, stress, or burnout in 2016. Demographic characteristics in 2016 for the 872 residents who completed both surveys are shown in Table 1. Notably, most respondents were female (72%), Caucasian (73%), and married or partnered (55%); most (65%) had debt levels exceeding \$100,000. The average age of 2016 respondents was 28.8 (SD = 3.3) years. For comparison, across the 9,067 pediatrics training at

207 U.S. ACGME-accredited pediatric residency programs in 2016-17, the average age of PGY1 residents was 28.6 years and 67% of residents were female.⁵⁶

Scores for the primary outcomes for 2016 and 2017 are shown in Table 2. Overall, none of the variables' average values changed significantly between 2016 and 2017. The percentage of residents who met criteria for burnout was 58%, and the average level of mindfulness was 2.8 in both 2016 and 2017. Levels of stress (16.4 and 16.2), confidence in providing compassionate care (60.5 and 61.3) and self-compassion (37.2 and 37.6) were also nearly identical in both years. Notably, residents' average stress levels were significantly greater than the general population's levels of 12 to 14 ($P < 0.001$).^{44,47} Although residents' item scores on the mindfulness scale were similar to normative values, self-compassion was significantly higher than normative values ($P < 0.001$).^{52,57}

Correlations between 2016 and 2017 values of the key predictor and outcome variables using paired data are shown in Table 3. Correlations among the same variables in 2016 and 2017 ranged from 0.55 (for the CCCS) to 0.73 (for Neff's Self-Compassion Scale); all were significant at $P < 0.001$. In both years, stress significantly correlated cross-sectionally with burnout; both stress and burnout were inversely correlated with mindfulness, self-compassion, and confidence in providing calm, compassionate care.

Next, we examined how 2016 scores related to 2017 scores (Table 4). After controlling for 2016 burnout scores in a linear mixed model analysis, we found that self-compassion scores ($P = 0.03$), but not mindfulness scores ($P = 0.4$) in 2016 were inversely associated with burnout scores in 2017. After controlling for 2016 stress scores, scores of mindfulness ($P = 0.01$) and self-compassion ($P < 0.001$) in 2016 were inversely associated with stress scores in 2017. After controlling for 2016 scores on the CCCS, scores on both the mindfulness scale ($P = 0.02$) and

self-compassion scale ($P = 0.04$) in 2016 were significantly associated with CCCS scores in 2017. For example, each one-point increase in self-compassion was associated with -0.17 points on the MBI (burnout) score, -0.16 points on the PSS (stress scale), +0.17 points on the CCCS, and a 6% reduction in burnout. An increase of one standard deviation on the CCCS score was associated with a reduction from 58% to 48% in the probability of burnout.

Discussion

This national study involving over 850 pediatric residents from 31 geographically dispersed residency programs has provided four major findings. First, the prevalence of burnout in pediatric residents was 58% in both 2016 and 2017, confirming our first hypothesis that scores would be stable and comparable to the high rates previously reported in other smaller studies of pediatric residents.^{3,33,35,36} Second, as hypothesized, pediatric residents' average stress scores were significantly higher than those of the general population, and mindfulness levels were comparable to the general population; however, contrary to our hypothesis, residents' self-compassion scores were higher than those reported for the general population. Third, variables of interest were significantly correlated in expected directions; for example, self-compassion correlated positively with mindfulness but inversely with perceived stress. Finally, after controlling for 2016 levels of stress and burnout, higher mindfulness scores in 2016 were associated with lower stress scores in 2017; and higher scores on self-compassion in 2016 were associated with lower levels of both stress and burnout in 2017. Likewise, after controlling for 2016 levels of confidence in offering compassionate care, higher scores on mindfulness and self-compassion in 2016 were associated with higher scores on the CCCS in 2017. Taken together, these regression analyses suggest longitudinal—not simply cross-sectional—relationships among mindfulness, self-compassion, and outcomes of interest such as burnout.

Our study confirms the high rate of burnout in pediatric residents reported in earlier studies and extends it to a larger, longitudinal sample. Using data from a 2-item screen for burnout conducted in 2011, Shanafelt and colleagues reported (in 2012) that US physicians had significantly higher rates of burnout compared to a probability-based sample of US working adults (37.9% compared to 27.8%).⁴³ When they repeated this study in 2014 using the full MBI, the rates of burnout had increased for all specialties and had increased significantly in pediatrics from 35.3% to 46.3%.⁵⁸ Notably, residents and fellows reported higher burnout rates than early career physicians.⁵⁸ In another study, Pantaleoni followed pediatric residents longitudinally at the Lucile Packard Children's Hospital from 2010 to 2012 and found a significant increase in burnout between the start of residency and 6 months into the internship year.³ Further results showed that burnout rates among residents remained stable throughout the 2nd and 3rd years of residency at just under 50%.³

Other investigators have conducted research on what—if anything—may ameliorate burnout. Attempts at mitigating burnout through duty hour restrictions have had mixed results.^{59,60} Investigators conducting a study with residents from 13 specialties noted that lower burnout was associated with using meditation, relaxation, massage, and other wellness strategies.⁶¹ West and colleagues conducted a systematic review and meta-analysis of interventions implemented to prevent and reduce physician burnout; their findings revealed that both individual and organizational strategies are critical.⁶² Individual-focused strategies that were effective were mindfulness-based approaches and stress management training.⁶² Results of another review align with West and colleagues' findings: mindfulness and stress management must be cultivated in trainees since learning to be sensitive and to cope with stress are essential skills for health care workers.⁶³

We confirmed our earlier observation that mindfulness and self-compassion are strongly correlated with each other, positively associated with confidence in providing compassionate care, and protective against burnout.^{20,33} Previous research has linked greater mindfulness to less burnout in health professionals,^{24,50,64-66} which has important implications for patient care since more mindful clinicians provide more patient-centered care.⁴ To illustrate, Dobkin and colleagues showed that mindfulness training improved clinicians' mindfulness and well-being, and that patients perceived the clinicians who scored higher on one measure of mindfulness as providing more patient-centered care.⁶⁷

Our research suggests that cultivating self-compassion in trainees may be a helpful approach because compassion fatigue is, in essence, a form of burnout and our longitudinal data suggest that self-compassion is protective.⁶⁸

We conducted this study in pediatric residencies whose PDs had shown strong interest in burnout. The results may not be generalizable to residency programs in other specialties whose PDs have different priorities. Our sample had a slightly higher percentage of female respondents than the percentage of female respondents across U.S. pediatric residency programs during this period, and this difference may have affected our results in ways that limit generalizability. We conducted our study across a very limited time period and did not assess the impact of residency or institution-level interventions that may have been concurrent or longitudinal. Future studies should assess the effect of individual, unit-level, and institution-level interventions. We did not examine the impact of burnout or stress on patient care in this study, though other studies have suggested deleterious effects on patient care. Future studies would be strengthened by including patient-level outcomes. We did not measure stress and burnout in nursing staff or faculty though

both could well affect residents' levels of stress and burnout. Future studies should consider a more comprehensive systems-based, ecological approach that includes other disciplines.

Conclusions

In this national study, we found that stress and burnout are common and not improving despite national calls to action. Mindfulness and self-compassion appear to be promising interventional targets for trainees due to their longitudinal associations with lower stress and burnout. Pediatric residency PDs can use these data to design and evaluate training in mindfulness and self-compassion to potentially mitigate the effects of stress and burnout on their trainees.

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Figure Legend

Figure 1

Map of the United States showing the location of the 31 sites where the 872 residents who participated in a study of mindfulness, burnout, and self-compassion in 2016 and 2017 trained. Light gray circles indicate study sites (some sites are geographically near, so a few circles overlap). See List 1 for the names of the 31 institutions.

ACCEPTED

Table 1
Demographic Characteristics of 872 Pediatric Residents from 31 Different Residency Programs Participating in the Pediatric Resident Burnout-Resilience Study Consortium (PRB=RSC), 2016

Characteristic	No. (% of 872)
Gender	
Female	629 (72)
Male	243 (28)
Race^a	
Caucasian	630 (73)
Asian	123 (14)
Hispanic	43 (5)
African-American	25 (3)
Native American/ Pacific Islander	6 (1)
Other	40 (5)
Post-graduate residency year	
1	473 (54)
2	399 (46)
Married or partnered	
	479 (55)
Debt level	
< \$50,000	223 (26)
\$50,000 – \$100,000	80 (9)
> \$100,000	565 (65)
Those who participated in mind-body skills training in the past 3 years^{ab}	
Mindfulness	260 (30)
Yoga	231 (27)
Meditation	169 (19)
Biofeedback	106 (12)
Guided imagery	78 (9)
Compassion meditation	46 (5)

^a Respondents could select more than one answer.

^b Table 1 shows the mind-body training in the past 3 years reported by at least 5% of respondents. Less commonly reported types of mind-body training included the following: loving-kindness meditation (3%), progressive muscle relaxation (3%), Relaxation Response (3%), Therapeutic or Healing Touch (2%), hypnosis (1%), Nidra yoga (1%), qi gong (0.7%), and Tai Chi (0.7%).

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Table 2

Scores on Predictive and Outcome Variables for 872 Residents Participating in the Pediatric Resident Burnout-Resilience Study in 2016 and 2017

Variable and measure	2016	2017	<i>P</i> ^a
Mindfulness ^b : Mean (SD) [range]	2.8 (0.5) [1.3, 4]	2.8 (0.5) [1.3, 4]	0.31
Self-compassion ^c : Mean (SD) [range]	37.2 (7) [19, 58]	37.6 (7) [12, 60]	0.76
Stress ^d : Mean (SD) [range]	16.4 (6) [0, 36]	16.2 (6.3) [0, 37]	0.82
Burnout ^e : Percent of residents identified as having burnout	58.2	58.3	0.82
Confidence in providing compassionate care ^f : Mean (SD) [range]	60.5 (13.6) [16, 94]	61.3 (14.3) [14, 99]	0.38

^aNo differences were significant in paired comparisons.

^bMindfulness was measured using the 10-item Cognitive and Affective Mindfulness Scale, Revised. Normative population item mean is 2.8 with a potential range from 1 (low, poor mindfulness) to 4.

^cSelf-compassion was measured using Neff's 12-item Self Compassion Scale. Normative population mean is 36 with a potential range from 12 (low self-compassion) to 60.

^dStress was measured using the 10-item Perceived Stress Scale. Normative population means range from 12 to 14 with a potential range from 0 (no perceived stress) to 40.

^eBurnout, a dichotomous measure, was measured using the 22-item Maslach Burnout Inventory.

^fConfidence in providing compassionate care was measured using the Confidence in Providing Calm, Compassionate Care Scale. Normative population means range from 60 to 80 with a potential range of 0 (no confidence) to 100.

Table 3

Correlations [and 95% Confidence Intervals] Between Variables in the Pediatric Resident Burnout-Resilience Study, 2016 and 2017^a

Variable and year	PSS, 2016	PSS, 2017	MBI ^b , 2016	MBI ^b , 2017	CCCS, 2016	CCCS, 2017	CAMSR, 2016	CAMSR, 2017	SC, 2016	SC, 2017
PSS, 2016	1.0	–	–	–	–	–	–	–	–	–
PSS, 2017	0.57 (0.52, 0.61)	1.0	–	–	–	–	–	–	–	–
MBI ^b , 2016	0.66 (0.62, 0.69)	0.45 (0.39, 0.51)	1.0	–	–	–	–	–	–	–
MBI ^b , 2017	0.49 (0.44, 0.55)	0.64 (0.59, 0.68)	0.68 (0.64, 0.71)	1.0	–	–	–	–	–	–
CCCS, 2016	-0.31 (-0.37, -0.25)	-0.22 (-0.28, -0.15)	-0.34 (-0.40, -0.34)	-0.29 (-0.36, -0.23)	1.0	–	–	–	–	–
CCCS, 2017	-0.29 (-0.35, -0.22)	-0.34 (-0.41, -0.28)	-0.35 (-0.41, -0.28)	-0.43 (-0.49, -0.37)	0.55 (0.50, 0.60)	1.0	–	–	–	–
CAMSR, 2016	-0.59 (-0.63, -0.54)	-0.45 (-0.50, -0.39)	-0.44 (-0.49, -0.39)	-0.36 (-0.42, -0.30)	0.37 (0.31, 0.43)	0.32 (0.25, 0.38)	1.0	–	–	–
CAMSR, 2017	-0.46 (-0.52, -0.41)	-0.67 (-0.71, -0.63)	-0.38 (-0.44, -0.32)	-0.52 (-0.58, -0.47)	0.29 (0.22, 0.36)	0.45 (0.39, 0.51)	0.64 (0.60, 0.68)	1.0	–	–
SC, 2016	-0.59 (-0.63, -0.54)	-0.48 (-0.54, -0.42)	-0.47 (-0.52, -0.41)	-0.40 (-0.46, -0.34)	0.34 (0.28, 0.40)	0.30 (0.24, 0.37)	0.61 (0.56, 0.65)	0.54 (0.48, 0.59)	1.0	–
SC, 2017	-0.49 (-0.54, -0.43)	-0.64 (-0.68, -0.59)	-0.38 (-0.44, -0.32)	-0.52 (-0.57, -0.46)	0.29 (0.23, 0.36)	0.41 (0.35, 0.47)	0.50 (0.45, 0.56)	0.69 (0.65, 0.72)	0.73 (0.69, 0.76)	1.0

Abbreviations: PSS indicates Perceived Stress Scale; MBI, Maslach Burnout Inventory; CCCS, Confidence in Providing Calm, Compassionate Care Scale; CAMR, Cognitive and Affective Mindfulness Scale, Revised; SC, Self-Compassion Scale.

^aAll correlations are statistically significant at P<0.001 using paired data.

^bThe authors determined the MBI score for correlation analyses by adding Emotional Exhaustion and Depersonalization subscales

Table 4
Regression Analysis Showing Whether Mindfulness, Self-Compassion, or Residency Year Predict Burnout, Stress, or Compassionate Care

Measure or variable	Mixed <i>linear</i> models for burnout, stress, and confidence in providing compassionate care scores in 2017			Mixed <i>logistic</i> model for 2017: Dichotomous burnout score
	Burnout score in 2017	Stress score in 2017	Confidence in compassionate care score in 2017	
Number of residents in analysis	739	744	732	740
Being a PGY2 resident in 2016 (vs. PGY1)	-2.13 (0.84) ^a	-0.61 (0.37)	1.44 (0.88)	-0.38 (0.18) ^a
Mindfulness score in 2016	-1.00 (1.06)	-1.23 (0.49) ^a	2.49 (1.10) ^a	-0.18 (0.22)
Self-compassion score in 2016	-0.17 (0.08) ^a	-0.16 (0.04) ^b	0.17 (0.08) ^a	-0.06 (0.02) ^b
Burnout score in 2016	0.66 (0.03) ^b	–	–	–
Stress score in 2016	–	0.42 (0.04) ^b	–	–
Confidence in compassionate care score in 2016	–	–	0.52 (0.03) ^b	–
Burnout (vs not, dichotomous variable)	–	–	–	1.96 (0.18) ^b
Intercept	23.1	18.9	16.0	2.3
SD of program random intercept	1.32	0	0	0.24

Abbreviations: PGY indicates post-graduate year; SD, standard deviation.

^aRelationship significant at $P < .05$.

^bRelationship significant at $P < .001$.

Figure 1



ACCEPTED

List 1

Programs With Residents Participating in the Pediatric Resident Burnout-Resilience Study in Both 2016 and 2017

Albert Einstein College of Medicine (Montefiore)

Ann & Robert H. Lurie Children's Hospital of Chicago

Baylor College of Medicine (Houston)

Boston Children's Hospital/Boston Medical Center

Carolinas Medical Center

Case Western Reserve University/University Hospital Case Medical Center/Rainbow Babies and Children's Hospital

Children's Hospital of Philadelphia

Cincinnati Children's Hospital Medical Center/University of Cincinnati College of Medicine

Crozer-Chester Medical Center

Duke University Hospital Medical Center

Inova Fairfax Medical Campus/Inova Children's Hospital

Johns Hopkins University School of Medicine

Mayo Clinic College of Medicine (Rochester)

Medical College of Wisconsin

Nationwide Children's Hospital/Ohio State University

University of Arizona Health Sciences Center

University of California (Davis) Health System

University of California (Los Angeles) Medical Center

University of California (San Diego) Children's Hospital

University of Colorado Denver Children's Hospital

University of Illinois College of Medicine at Chicago

University of Kansas School of Medicine

University of Louisville School of Medicine

University of Michigan Medical Center

University of Minnesota Medical School

University of New Mexico Children's Hospital

University of Oklahoma College of Medicine (Tulsa)

University of Oklahoma Health Sciences Center (Oklahoma City)

University of Washington-Seattle Children's Hospital

University of Wisconsin Hospitals and Clinics

Wright State University

ACCEPTED