

Assessment of Adverse Childhood Experiences, Adverse Professional Experiences, Depression, and Burnout in US Physicians



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Abstract

Objective: To assess associations of adverse childhood experiences (ACEs) and adverse occupational experiences (AOEs) with depression and burnout in US physicians.

Participants and Methods: We performed a secondary analysis of data from a representative sample survey of US physicians conducted between November 20, 2020, and March 23, 2021, and from a probability-based sample of other US workers. The ACEs, AOE, burnout, and depression were assessed using previously published measures.

Results: Analyses included data from 1125 of the 3671 physicians (30.6%) who received a mailed survey and 6235 of 90,000 physicians (6.9%) who received an electronic survey. The proportion of physicians age 29-65 who had lived with a family member with substance misuse during childhood (673 of 5039 [13.4%]) was marginally lower ($P < .001$) than that of workers in other professions (448 of 2505 [17.9%]). The proportion of physicians age 29-65 who experienced childhood emotional abuse (823 of 5038 [16.3%]) was similar to that of workers in other professions (406 of 2508 [16.2%]). The average physician depression T-score was 49.60 (raw score \pm SD, 6.48 ± 3.15), similar to the normed US average. The AOE were associated with mild to severe depression, including making a recent significant medical error (odds ratio [OR], 1.64; 95% CI, 1.33 to 2.02, $P < .001$), being named in a malpractice suit (OR, 1.30; 95% CI, 1.07 to 1.59, $P = .008$), and experiencing one or more coronavirus disease 2019-related AOE (OR, 1.76; 95% CI, 1.56 to 1.99, $P < .001$). Having one or more ACEs was associated with mild to severe depression (OR, 1.58; 95% CI, 1.38 to 1.79, $P < .001$). The ACEs, coronavirus disease 2019-related AOE, and medical errors were also associated with burnout.

Conclusion: Assessing ACEs and AOE and implementing selective primary prevention interventions may improve population health efforts to mitigate depression and burnout in physicians.

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In the general population, adverse childhood experiences (ACEs) have been linked to multiple adverse health outcomes, including substance use (alcohol use problems, illicit drug use, and tobacco use), chronic disease (diabetes, heart disease, and respiratory disease), cancer, poor mental health, interpersonal violence, and self-harm.¹ Emotional abuse during

childhood has been associated with 170%-increased odds of lifetime depressive disorder in women and 150%-increased odds in men.² Having a parent with alcohol use disorder has also been associated with an increased risk of lifetime depressive disorder.³ In physicians, adverse occupational experiences (AOEs), including having to provide care for coronavirus disease 2019



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(COVID-19)—infected patients without adequate personal protective equipment (PPE),⁴ experiencing disruptive economic consequences of COVID-19,⁴ being named in a lawsuit,⁵ and being involved with medical errors,^{6,7} are associated with risk of burnout. Understanding the risk for depression and burnout associated with ACEs and AOE^s may help stakeholders address these important physician well-being outcomes.

Physician burnout is associated with personal health risks including depression,⁸ alcohol use disorders,⁹ and motor vehicle accidents.¹⁰ Physician burnout is also associated with lower quality of clinical care^{6,11-13} and related consequences including increased medical error,¹⁴⁻¹⁷ longer post-hospital discharge recovery times,¹⁸ and—in intensive care unit settings—increased mortality.¹⁹ Economic costs of physician turnover^{20,21} and reductions in time spent providing clinical care²² associated with burnout also justify concern for physician occupational distress and its causes. Multiple workplace determinants of occupational distress have been identified, including leadership behavior,²³ organizational-personal values alignment,²⁴ and clerical burden.²⁵ Individual physician-level determinants identified include sleep-related impairment,^{15,26} low self-valuation (self-compassion),^{27,28} and imposter phenomenon.²⁹ Given the recent increase of burnout and other forms of distress to unprecedented levels,³⁰ it is increasingly important to understand the risk factors for burnout and depression.

Adverse experiences during childhood and more recent adverse occupation-related experiences may represent identifiable risk factors for both depression and burnout in physicians. A regional study that assessed 10 ACEs found that 46% of physicians had experienced at least one ACE, that 9% met screening criteria for 4 or more ACEs, and that ACEs were associated with emotional exhaustion, but the study did not assess the depersonalization component of burnout.³¹

The primary objective of this study was to assess the associations between adverse experiences and depression in a representative sample of US physicians. Adverse

experiences for the purpose of this study included ACEs (emotional abuse and/or a household member with a substance use problem) and AOE^s (provided direct patient care without adequate PPE, experienced a disruptive economic consequence due to the COVID-19 pandemic, named in a malpractice suit, and made a medical error that resulted in patient harm in the past year). The secondary aim was to assess the associations between both ACEs and AOE^s and burnout. Finally, as part of this work, we also assessed the point prevalence of depression symptoms and depression severity in a large national sample of physicians by demographic and medical practice variable categories, using published T-scores normed to the general US population.

PARTICIPANTS AND METHODS

The methods for this national survey study of occupational well-being using a representative sample of practicing physicians in the United States have been reported elsewhere⁴ and are briefly summarized here. The core survey was mailed to 4000 physicians randomly sampled from the American Medical Association Physician Masterfile, with oversampling of physicians in specialties other than obstetrics and gynecology, family practice, general pediatrics, and internal medicine. Oversampling was applied to obtain larger specialty-specific sample sizes for smaller specialties. Of the 4000 surveys mailed, 329 were returned as undeliverable, rendering a sample of 3671. The initial mailing included a check for \$20 and was followed by a reminder, without additional incentive, mailed 3 weeks later. In addition, an electronic survey was sent to 90,000 physicians randomly sampled from the American Medical Association Physician Masterfile, excluding the 4000 physicians included in the mailed survey, and followed with reminder emails over the subsequent month. To assess possible differences between responders and nonresponders, an abbreviated 2-page follow-up survey was sent with a \$20 incentive to a random sample of 500 physicians who did not respond to the mailed survey and 500 who did not

respond to the electronic survey. Of these, 29 were returned as undeliverable, rendering a sample of 971. A comparison sample of workers in fields other than medicine was assembled using a probability-based sample of workers in the US population between ages 29 and 65 using KnowledgePanel (Ipsos; <https://www.ipsos.com/en-us/solutions/public-affairs/knowledgepanel>).

The study was approved by institutional review boards at Mayo Clinic and Stanford University.

Measures

Adverse childhood experiences were assessed using a 2-item screening instrument developed to efficiently identify adults who have experienced common ACEs.³² Consistent with previous reports, we defined ACEs as a positive response to at least 1 of the 2 ACEs items.³² A positive response to the emotional abuse item (“Did a parent, guardian or other household member yell, scream or swear at you, insult or humiliate you?”) is “Many times” vs any other response. A positive response to the alcohol item (“Did you live with a household member who was a problem drinker or alcoholic, or misused street or prescription drugs?”) is “Yes” vs “No.”

Adverse occupational experiences assessed for the current study included adverse COVID-19-related experiences,⁴ being named in a malpractice suit,⁵ and making a clinically significant medical error.^{15,33} We defined adverse COVID-19-related experiences as having at least 1 of the 2 COVID-19 experiences items reported previously to be independently associated with burnout (provided direct patient care without adequate PPE, “Yes” vs “No”; and experienced a disruptive economic consequence due to the COVID-19 pandemic, “Yes” vs “No”).⁴ We defined malpractice suit as the responding physician indicating that they had gone through a medical malpractice suit in the past 2 years. We defined recent clinically significant medical error as “a medical error that did result in patient harm” within the past year.¹⁵

Depression symptoms were assessed using the 4-item short form Patient-Reported

Outcomes Measurement Information System (PROMIS) depression measure.^{34,35} Response options are on a 5-point Likert scale from “Never” to “Always.” The PROMIS 4-item scale has similar diagnostic operating characteristics to longer 6- and 8-item PROMIS depression scales and is equivalent to the 9-item Patient Health Questionnaire (PHQ-9) in sensitivity and specificity for detecting major depressive disorder and for detecting any unipolar depressive disorder.³⁵ The PROMIS data bank provides nationally normed, item response theory-based T-scores, with a score of 50 set to the population median and each 10-point interval equal to one standard deviation. Previous research has documented a raw score of 8 to be the optimal screening cut point for detecting unipolar depressive disorders.³⁵ A raw score of 8 corresponds approximately to a T-score of 55, which is 0.5 SDs above the median and indicates more depression than 69% of the general population. Raw scores of 8 or more represent mild to severe depression symptoms. A raw score of 11 corresponds to a T-score of 60, which is 1.0 SD above the median. Raw scores of 11 or more represent moderate to severe depression.

Burnout was assessed using the Maslach Burnout Inventory emotional exhaustion (9 items) and depersonalization (5 items) scales, which we used under license from Mind Garden, Inc.³⁶⁻³⁸ Response options for items in both scales are on a 7-point frequency scale from “never” to “every day.” The survey also assessed personal and professional characteristics, including sex, age, work hours, primary care vs non-primary care, practice specialty, frequency of nights on-call, and practice setting.

Statistical Analyses

Standard descriptive summary statistics were reported for physician demographic characteristics. Prevalence of depression symptoms was reported for each demographic category. Depression T-scores were compared using independent sample *t* test or analysis of variance where appropriate. The association between depression symptoms and adverse experiences was first examined using

TABLE 1. Demographic and Practice Characteristics of the Study Group, Stratified by PROMIS 4-Item Depression Scale T-Scores^{a,b}

Variable	All 2020 physician survey respondents (N=7360)	Depression point prevalence		Depression T-score (raw score \pm SD)	P value ^e
		Mild to severe ^c	Moderate to severe ^d		
Sex					<.001
Male	3915 (62.1)	996 (25.8)	415 (10.7)	48.78 (6.22 \pm 3.09)	
Female	2387 (37.9)	862 (36.4)	350 (14.8)	50.87 (6.91 \pm 3.17)	
Other	4 (0.1)	3 (75.0)	2 (50.0)	56.58 (9.75 \pm 4.27)	
Missing	1054	NA	NA	NA	
Age (y)					<.001
Median (IQR)	54.0 (44.0-62.0)				
Age group					
<35	216 (3.5)	60 (28.2)	31 (14.6)	49.52 (6.49 \pm 3.26)	
35-44	1323 (21.7)	449 (34.2)	218 (16.6)	50.58 (6.88 \pm 3.40)	
45-54	1597 (26.2)	540 (34.1)	218 (13.8)	50.26 (6.73 \pm 3.20)	
55-64	1793 (29.4)	502 (28.3)	201 (11.3)	49.56 (6.42 \pm 3.08)	
65+	1162 (19.1)	240 (21.0)	74 (6.5)	47.48 (5.74 \pm 2.68)	
Missing	1269	NA	NA	NA	
Relationship status					<.001
Single	675 (10.7)	283 (42.2)	145 (21.6)	52.06 (7.48 \pm 3.64)	
Married	5253 (83.4)	1424 (27.4)	555 (10.7)	49.12 (6.30 \pm 3.01)	
Partnered	293 (4.7)	130 (44.8)	56 (19.3)	52.12 (7.41 \pm 3.48)	
Widowed/widower	79 (1.3)	23 (29.1)	10 (12.7)	49.13 (6.46 \pm 3.52)	
Missing	1060	NA	NA	NA	
Hours worked per week					<.001
Median (IQR)	50.0 (40.0-60.0)	NA	NA	NA	
<40	1312 (19.3)	331 (27.2)	109 (8.9)	48.89 (6.22 \pm 2.94)	
40-49	1593 (23.5)	419 (27.9)	179 (11.9)	49.09 (6.31 \pm 3.01)	
50-59	1616 (23.8)	465 (29.9)	184 (11.8)	49.53 (6.44 \pm 3.02)	
60-69	1436 (21.2)	412 (30.3)	183 (13.4)	50.11 (6.62 \pm 3.23)	
70-79	375 (5.5)	123 (34.6)	55 (15.4)	50.40 (6.82 \pm 3.45)	
\geq 80	449 (6.6)	155 (37.3)	77 (18.6)	51.38 (7.29 \pm 3.91)	
Missing	579	NA	NA	NA	
Specialty					<.001
Anesthesiology	331 (4.5)	83 (28.5)	38 (13.1)	49.60 (6.51 \pm 3.27)	
Dermatology	175 (2.4)	49 (31.6)	22 (14.2)	49.19 (6.48 \pm 3.36)	
Emergency med	416 (5.7)	137 (38.3)	62 (17.3)	50.93 (7.04 \pm 3.43)	
Family med	517 (7.1)	159 (35.8)	72 (16.2)	50.42 (6.83 \pm 3.30)	
General surgery	235 (3.2)	63 (29.6)	22 (10.3)	49.69 (6.51 \pm 3.20)	
General surgery subspecialty	556 (7.6)	129 (25.7)	46 (9.2)	49.00 (6.19 \pm 2.87)	
Internalmed, general	509 (7.0)	151 (33.3)	69 (15.2)	50.75 (6.90 \pm 3.46)	
Internal med, subspecialty	718 (9.8)	182 (28.7)	59 (9.3)	49.30 (6.33 \pm 2.97)	
Neurology	251 (3.4)	55 (24.9)	23 (10.4)	48.56 (6.10 \pm 2.93)	
Neurosurgery	76 (1.0)	13 (20.0)	4 (6.2)	47.40 (5.68 \pm 2.62)	
Obstetrics and gynecology	310 (4.2)	88 (33.6)	42 (16.0)	50.76 (6.93 \pm 3.44)	
Ophthalmology	304 (4.2)	52 (19.1)	21 (7.7)	47.80 (5.83 \pm 2.60)	
Orthopedic surgery	370 (5.1)	66 (20.8)	24 (7.6)	47.96 (5.83 \pm 2.69)	
Otolaryngology	66 (0.9)	16 (28.1)	9 (15.8)	50.24 (6.82 \pm 3.93)	
Other	492 (6.7)	122 (30.3)	55 (13.7)	50.09 (6.62 \pm 3.22)	
Pathology	194 (2.7)	50 (29.1)	30 (17.4)	49.62 (6.59 \pm 3.31)	
Pediatrics, general	370 (5.1)	92 (27.5)	34 (10.1)	48.87 (6.22 \pm 2.90)	
Pediatric subspecialty	263 (3.6)	73 (31.9)	29 (12.7)	49.74 (6.59 \pm 3.31)	
Phys med and rehab	166 (2.3)	48 (32.7)	20 (13.6)	50.27 (6.74 \pm 3.34)	
Prev med/occup med	30 (0.4)	6 (24.0)	2 (8.0)	48.85 (6.20 \pm 3.07)	

Continued on next page

TABLE 1. Continued

Variable	All 2020 physician survey respondents (N=7360)	Depression point prevalence		Depression T-score (raw score \pm SD)	P value ^e
		Mild to severe ^c	Moderate to severe ^d		
Specialty, continued					
Psychiatry	583 (8.0)	164 (31.8)	59 (11.5)	49.59 (6.45 \pm 2.99)	
Radiation oncology	62 (0.8)	16 (30.2)	6 (11.3)	49.40 (6.38 \pm 2.73)	
Radiology	274 (3.7)	80 (32.0)	33 (13.2)	50.14 (6.67 \pm 3.20)	
Urology	43 (0.6)	15 (38.5)	4 (10.3)	49.78 (6.64 \pm 3.24)	
Missing	49	NA	NA	NA	
Primary practice setting					
Private practice	3810 (57.0)	1102 (30.0)	472 (12.9)	49.66 (6.52 \pm 3.19)	
Academic med center	1863 (27.9)	510 (28.3)	204 (11.3)	49.44 (6.40 \pm 3.07)	
Veterans hospital	148 (2.2)	49 (35.0)	16 (11.4)	50.24 (6.69 \pm 3.35)	
Active military practice	38 (0.6)	9 (23.7)	6 (15.8)	48.98 (6.32 \pm 3.27)	
Other	820 (12.3)	241 (31.1)	90 (11.6)	49.58 (6.45 \pm 3.04)	
Missing	681	NA	NA	NA	

^aIQR, interquartile range; med, medicine; NA, not applicable; occup, occupational; Phys, physical; Prev, preventive; PROMIS, Patient-Reported Outcomes Measurement Information System; rehab, rehabilitation.

^bData are presented as No. (percentage) of participants unless indicated otherwise.

^cMild to severe depression corresponds to a raw score of ≥ 8 .

^dModerate to severe depression corresponds to a raw score of ≥ 11 .

^eFor difference in mean score by category.

univariable logistic regressions and then adjusted for sex, age category, relationship status, hours worked per week, and practice specialty, all of which were associated with physician well-being in a previous analysis.⁴ Similarly, the association between burnout and adverse experiences was first examined using univariable logistic regressions and subsequently adjusted for sex, age category, relationship status, hours worked per week, and practice specialty. All tests of statistical significance were 2-tailed, with a type I error rate set at .05. All statistical analyses were conducted using R statistical software, version 4.1.2 (R Core Team).

RESULTS

A total of 1125 of 3671 physicians who received the mailed survey (30.6%) and 6235 of 90,000 who received the electronic survey (6.9%) participated in the study. Of the 976 who received the secondary survey, 210 (21.5%) responded. As previously reported, no statistically significant differences were observed in demographic characteristics, professional factors, burnout, or work-life integration scores between responders to the mailed/electronic survey and

participants in the secondary survey of non-responders, suggesting that participants in the mailed/electronic surveys were generally representative of the overall sample and US physicians in these domains.⁴ The demographic characteristics of participants were also similar to all 897,107 practicing US physicians. Physicians responding to the mailed and electronic surveys were subsequently pooled for further analysis.

Among the 7360 physician survey responders, 6208 completed the ACEs question on emotional abuse and 6213 completed the ACEs questions on living with a household member with problematic substance use. Of the 6208 physicians who completed the ACEs question on emotional abuse during childhood, 969 (15.6%) responded affirmatively to the question. Among US workers in other fields age 29-65, 406 of 2508 (16.2%) responded affirmatively, similar to 823 of 5038 (16.3%) physicians age 29-65 ($P=.91$). Of the 6213 physicians who completed the ACEs questions on living with a household member with problematic substance use, 811 (13.1%) responded affirmatively to the question. Among US workers in other fields age

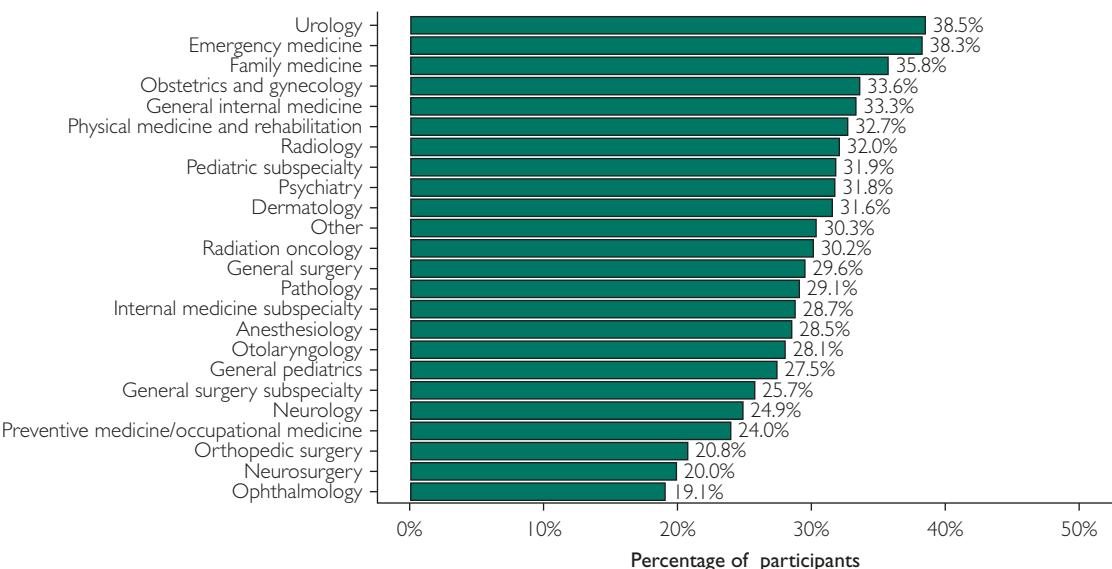


FIGURE 1. Percentage of study participants with mild to severe depression symptoms by specialty.

29-65, 448 of 2505 (17.9%) indicated they had experienced this ACE, which is marginally higher than 673 out of 5039 (13.4%) physicians ($P<.001$). Of 6218 physician respondents, 1491 (24.0%) had experienced at least 1 of the 2 ACEs.

Overall, 30.9% of physicians (1931 of 6252) had provided care to COVID-19-infected patients while not having adequate PPE and 39.6% (2475 of 6257) experienced disruptive economic consequences due to the COVID-19 pandemic. Of 6259 physicians who responded to at least 1 of the 2 COVID-19 questions, 54.6% (3419) experienced at least 1 of the 2 adverse COVID-19-related events. Fewer had been named in a malpractice suit in the past year (591 of 6444 [9.2%]) or made a medical error that resulted in patient harm in the past year (480 of 6415 [7.5%]).

On average, physicians' depression scores were similar to the PROMIS data bank normed US average (physician T-score, 49.60 [raw score \pm SD, 6.48 ± 3.15] vs population T-score of 50). Among the 6450 physicians who responded to the depression questions, 1920 (29.8%) had mild to severe depression symptoms (PROMIS 4-item depression scale score, ≥ 8). **Table 1**

summarizes the demographic characteristics of the responding physicians and their medical practice characteristics, including the proportion with mild to severe depression. **Table 1** also shows the portion of physicians with moderate to severe depression symptoms, by demographic and medical practice specialty and practice setting.

Average depression levels differed by sex, age category, relationship status, work hours, and practice specialty but not by practice setting. Of 2367 women who responded to the depression questions, 862 (36.4%) had mild to severe depression symptoms compared with 996 of 3866 men (25.8%). Depression levels were highest during mid-career years from age 35 through 54. Among relationship status categories, married physicians had the lowest level of depression. Depression levels increased modestly with number of work hours. **Figure 1** shows the percentage of physicians with mild to severe depression by specialty. Emergency medicine physicians had the highest level of depression, with an average T-score of 50.93 (raw score \pm SD, 7.04 ± 3.43) and 38.3% (137 of 358) reporting mild to severe depression symptoms. Neurosurgeons had the lowest level of depression (average T-

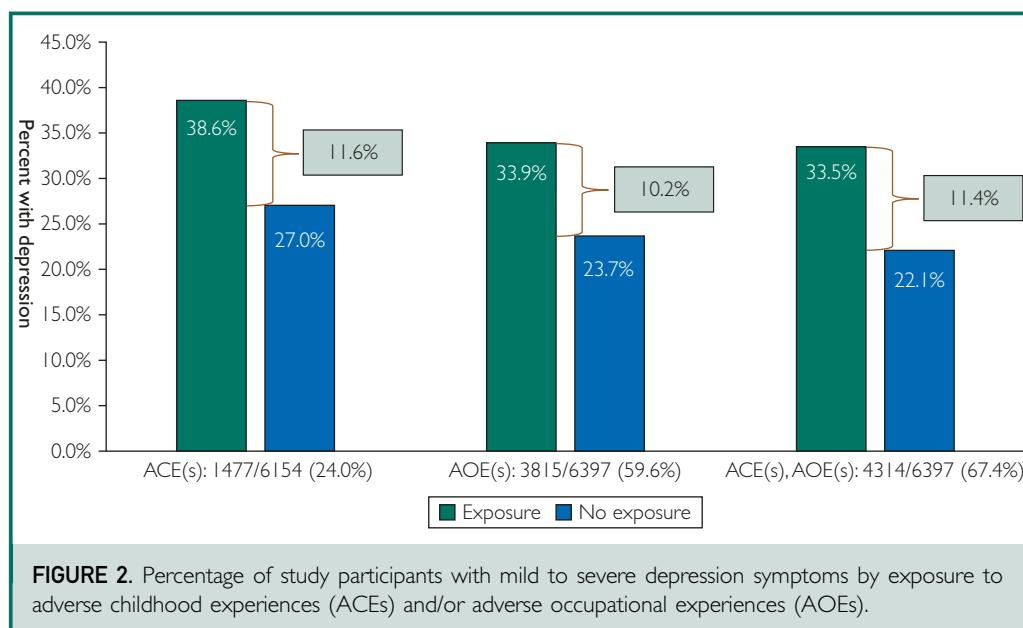


FIGURE 2. Percentage of study participants with mild to severe depression symptoms by exposure to adverse childhood experiences (ACEs) and/or adverse occupational experiences (AOEs).

score, 47.40; raw score \pm SD, 5.68 ± 2.62), with 20.0% (13 of 65) reporting mild to severe depression symptoms. Burnout levels overall and by specialty assessed by the Maslach Burnout Inventory have been published elsewhere, with 38.2% of the overall sample experiencing one or more symptoms of burnout.⁴

Figure 2 illustrates the proportion of physicians reporting mild to severe depression symptoms with and without exposure to ACEs, to AOEs, and to ACEs or AOEs. The risk for mild to severe depression attributable to exposure to ACEs was 11.6%. This means that although we cannot determine a causal relationship, 11.6% of physicians with exposure to ACEs had mild to severe depression that is attributable to risk associated with exposure to ACEs. The risk of mild to severe depression attributable to AOEs was 10.2%. The risk of mild to severe depression attributable to AOEs is similar to the risk attributable to ACEs and affects a much larger total number because of higher incidence of AOEs relative to ACEs.

Table 2 shows the associations between each adverse event category and odds of mild to severe depression. Having experienced one or both ACEs, one or both adverse

COVID-19 experiences, and a significant medical error were all associated with increased odds of mild to severe depression, before and after adjusting for demographic and practice characteristics. In the adjusted model, physicians who had to care for COVID-19 patients while not having adequate PPE or had experienced significant COVID-19-related economic consequences had 76% higher odds of mild to severe depression (odds ratio [OR], 1.76; 95% CI, 1.56 to 1.99). Experiences of one or both ACEs and a significant medical error were

TABLE 2. Association of Adverse Childhood Experiences and Adverse Professional Experiences With Depression^{a,b,c}

Variable	Model 1, OR (95% CI)	Model 2, OR (95% CI)
Adverse childhood experience(s)	1.70 (1.50-1.92)	1.58 (1.38-1.79)
Adverse COVID-19 experience(s)	1.74 (1.55-1.95)	1.76 (1.56-1.99)
Named in malpractice suit	1.19 (0.99-1.43)	1.30 (1.07-1.59)
Medical error that resulted in patient harm	1.54 (1.27-1.87)	1.64 (1.33-2.02)

^aCOVID-19, coronavirus disease 2019; OR, odds ratio.

^bModel 1 was unadjusted. Model 2 was adjusted for demographic variables: sex, age category, relationship status, hours worked, and practice specialty.

^cAdverse experiences listed were tested for their associations with depression separately. Each line in this table represents a different unadjusted and adjusted version of a different logistic regression model.

TABLE 3. Association of Adverse Childhood Experiences and Adverse Professional Experiences With One or More Symptom of Burnout^{a,b,c}

Variable	Model 1, OR (95% CI)	Model 2, OR (95% CI)
Adverse childhood experience(s)	1.54 (1.37-1.74)	1.46 (1.29-1.66)
Adverse COVID-19 experience(s)	1.75 (1.58-1.94)	1.69 (1.50-1.89)
Named in malpractice suit	1.24 (1.04-1.47)	1.21 (0.99-1.46)
Medical error that resulted in patient harm	1.69 (1.40-2.04)	1.65 (1.34-2.02)

^aCovid-19, coronavirus disease 2019; OR, odds ratio.

^bModel 1 was unadjusted. Model 2 was adjusted for demographic variables: sex, age category, relationship status, hours worked, and practice specialty.

^cAdverse experiences listed were tested for their associations with burnout separately. Each line in this table represents a different unadjusted and adjusted version of a different logistic regression model.

associated with 58% (OR, 1.58; 95% CI, 1.38 to 1.79) and 64% (OR, 1.64; 95% CI, 1.33 to 2.02) greater odds of mild to severe depression, respectively. Being named in a malpractice suit was associated with 30% greater odds of mild to severe depression (OR, 1.30; 95% CI, 1.07 to 1.59).

Table 3 shows associations between ACEs and AOEs and odds of having symptoms of burnout. In the adjusted model, the experience of an adverse COVID-19-related event was associated with 69% greater odds of burnout (OR, 1.69; 95% CI, 1.50 to 1.89, $P<.001$). Experience of one or more ACEs was associated with 46% greater odds of burnout (OR, 1.46; 95% CI, 1.29 to 1.66, $P<.001$). Making a medical error that resulted in patient harm in the past 12 months was associated with 65% greater odds of burnout (OR, 1.65; 95% CI, 1.34 to 2.02, $P<.001$). In the adjusted model, the association between being named in a malpractice suit and odds of burnout (OR, 1.21; 95% CI, 0.99 to 1.46, $P=.053$) was not statistically significant.

DISCUSSION

To our knowledge, this is the first national study of ACEs, AOEs, depression, and burnout in US physicians. We found that 24.0% of physicians had experienced at least 1 of the 2 ACEs assessed, with a prevalence of childhood emotional abuse similar to or less than that of workers in other fields, and marginally lower prevalence of living with a

household member with substance misuse. Individual COVID-19-related adverse experiences described in the current study were first reported elsewhere.⁴ We found that the majority of physicians (54.6%) had experienced at least 1 of the 2 adverse COVID-19 experiences evaluated.⁴ Although at a lower rate than adverse COVID-19 AOE, a substantial portion of physicians reported other AOE, with 9.2% indicating they had been named in a malpractice suit in the past year, and 7.5% indicating they had made an error “that did result in patient harm” within the past year. Consistent with previous reports, the present study found that ACEs,³¹ making a significant medical error,⁷ and COVID-19-related AOE,⁴ are associated with physician burnout. The current study also found that all ACEs and AOE assessed were associated with higher odds of mild to severe depression symptoms in physicians. Consistent with previous data, levels of depression in physicians in the present study were similar to those of the general US population.³⁹

In contrast, repeated observations document that physicians are at higher risk for burnout compared with workers in other fields.^{4,30,39} Burnout and depression are distinct constructs.^{16,40} While physicians experience increased risk of burnout relative to workers in other fields,⁴ previous data do not indicate that practicing physicians are at increased risk for depression.³⁹ Nonetheless, depression is the single largest contributor to disability worldwide.⁴¹ Some evidence indicates that depression, but not burnout, is directly associated with suicide risk in physicians.¹⁶ The majority of physicians who screen positive for severe depression also have concurrent symptoms of burnout, whereas a smaller portion of those experiencing symptoms of burnout also screen positive for depressive symptoms.¹⁶ Understanding the risk factors for depression is important for all adult populations.

The US Preventive Services Task Force recommends screening for depression in all adults.⁴² Participation rates for universal screening for depression among physicians and medical trainees have been low to date,

with a 13% participation rate⁴³ reported by one site and a 7% participation rate⁴⁴ reported by another site. It may be that some physicians who would not directly participate in a screening for depression would be persuaded to do so via screening for adverse experiences coupled with education on increased risk for depression associated with adverse experiences. Secondary prevention efforts, including timely detection and referral of those with severe depression symptoms for intervention may be enhanced by screening for adverse experiences and tracking adverse occupational experiences as they occur.

Based on our study's results, screening for the 2 ACEs included in the current study, followed by administration of the 4-item PROMIS depression scale, would allow for detection of the 38.6% of physicians with ACEs who have mild to severe depression symptoms. Multiplying the proportion of physicians with exposure to ACEs (0.24) by the point prevalence of depression in this group (0.386) renders the total number of cases of depression per 100 physicians ($[0.24 \times 0.386] \times 100 = 9.4\%$). This equation suggests that approximately 9 physicians with mild to severe depression symptoms would be detected in every 100 physicians willing to screen for ACEs followed by the PROMIS 4-item depression screen administered to those who report ACEs, assuming that the physician characteristics and depression levels are comparable to the current study sample. Similar calculations demonstrate that approximately 20 cases of mild to severe depression symptoms will be detected in every 100 physicians who are willing to screen for AOE^s followed by subsequent PROMIS 4-item screening for those with AOE^s. Approximately 23 cases of mild to severe depression symptoms per 100 physicians would be detected when pairing screening for all ACEs and AOE^s included in the current study with subsequent depression screening. These findings suggest the utility of including ACEs and AOE^s in a population mental health approach to physician well-being.⁴⁵

The value of considering adverse experiences in the context of a physician

population mental health approach may be most compelling for selective primary prevention. The present study found that significant risk for depression symptoms is associated with ACEs and AOE^s. It would be worthwhile to develop, implement, and evaluate the efficacy of selective prevention efforts to mitigate risk for depression in physicians who are not exhibiting depression symptoms. Mindfulness-based interventions have been found to be effective in targeted approaches to improve the mental health of adults with a history of ACEs.⁴⁶ Physicians who completed a mindfulness intervention during the COVID-19 pandemic reported lower postintervention anxiety and depression scores compared with preintervention scores, suggesting that mindfulness practice may help physicians cope with pandemic-related AOE^s.⁴⁷ Other strategies including cognitive behavioral therapy-based interventions⁴⁸ and interpersonal therapy-based interventions⁴⁹ may also be effective. Such efforts might prevent the onset of depression symptoms, particularly with monitoring of AOE^s and offering timely selective primary prevention intervention to exposed physicians.

Limitations of the current study include the lack of support for causal inference inherent in cross-sectional study designs. Further research with longitudinal data is needed to test hypotheses that seem plausible by examination of associations demonstrated by this report. In addition, it is not possible to assess the degree to which unmeasured covariates may have biased estimated associations between independent variables and depression. Generalization of the results of the current study is also limited by the low response rate. However, compared with studies aiming to establish prevalence or incidence of burnout, a low response rate may be less problematic in evaluating associations between adverse experiences, depression, and burnout. In addition, the most prevalent AOE^s reported in the current study were associated with early stages of the COVID-19 pandemic. While the general utility of screening for or tracking AOE^s in physicians may be

generalizable, the exact nature of AOEs that are most important may change over time.

CONCLUSION

Adverse occupational and childhood experiences are associated with increased levels of depression and burnout in physicians. Identifying, developing, and implementing selective primary prevention interventions for physicians who have experienced adverse experiences but who do not have severe depression may be an important addition to population mental health promotion efforts. In addition, following national guidelines to offer screening for depression linked to appropriate treatment resources to physicians is appropriate, as recommended for all US adults.

POTENTIAL COMPETING INTERESTS

Drs Trockel, Dyrbye, and Shanafelt have received honoraria for presentations and provided advice for health care organizations. Drs Dyrbye and Shanafelt are coinventors of the Well-being Index instruments. Mayo Clinic holds the copyright for these instruments and has licensed them for use outside Mayo Clinic. Mayo Clinic pays Drs Shanafelt and Dyrbye a portion of any royalties received. Dr Shanafelt is the coinventor of the Participatory Management Leadership Index. Mayo Clinic holds the copyright for this instrument, has licensed it for use outside Mayo Clinic, and pays Dr Shanafelt a portion of any royalties received. Dr Tutty is a board member for Emergence Healthcare Group. The other authors report no competing interests.

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Abbreviations and Acronyms: ACE, adverse childhood experience; AOE, adverse occupational experience; COVID-19, coronavirus disease 2019; OR, odds ratio; PPE, personal protective equipment; PROMIS, Patient-Reported Outcomes Measurement Information System

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