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ORIGINAL ARTICLE

Social Isolation and Burnout, Professional Fulfillment, and Suicidal Ideation Among US Physicians

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Abstract

Objective: To determine the degree of social isolation experienced by US physicians and evaluate the relationship of social isolation with personal and professional characteristics, burnout, professional fulfillment, and suicidal ideation.

Participants and Methods: Between November 20, 2020, and March 23, 2021, we surveyed US physicians and a probability-based sample of the US working population. Social isolation was measured using the Patient-Reported Outcomes Measurement Information System (PROMIS) 4-item social isolation instrument. Burnout and professional fulfillment were measured using standardized instruments. Suicidal ideation during the past 12 months was assessed using a single dichotomous item.

Results: Among 3103 physician responders, the mean T-score for social isolation was 48.2 (range, 0-100). Social isolation scores were higher for women than men physicians (mean, 49.7 vs 47.4; $P<.001$) and were lower among married physicians. Proportions with overall burnout, lowest quartile professional fulfillment, and suicidal ideation in the previous 12 months were 65.7%, 47.0%, and 14.8%, respectively, in the worst-quartile social isolation group vs 15.3%, 7.7%, and 2.3% in the best-quartile social isolation group (all $P<.001$). For each 1-point higher social isolation score, the odds of burnout, lowest-quartile professional fulfillment, and reporting suicidal ideation were 10% higher (odds ratio [OR] burnout, 1.10; 95% CI, 1.09 to 1.12; $P<.001$), 11% higher (OR lowest-quartile professional fulfillment, 1.11; 95% CI, 1.09 to 1.12; $P<.001$), and 9% higher (OR suicidal ideation, 1.09; 95% CI, 1.07 to 1.11; $P<.001$). On multivariable analysis, physicians were more likely to report "I feel isolated from others" than workers in other fields (OR, 1.28; 95% CI, 1.15 to 1.43; $P<.001$).

Conclusion: Social isolation is associated with increased burnout, suicidal ideation, and lower professional fulfillment, and is more common among US physicians than workers in other fields.

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Social isolation and loneliness are societal and public health issues that have been exacerbated by the COVID-19 pandemic.[1] The importance of these concerns is highlighted by the focus of the 2023 US Surgeon General's Advisory on the Healing Effects of Social Connection and Community, citing an "epidemic of loneliness and isolation."[1] As noted in this advisory, social connection is an essential part of being human and lack of social connection is associated with poor health outcomes, including heart disease, mental health issues, and early mortality.[1-3] Despite these potential consequences of social isolation, markers of social connection have been declining in the United States even before the pandemic. For example, from 2003 to 2020 in-person social engagement decreased and time spent alone increased among US

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adults.[4] The COVID-19 pandemic placed additional stress on opportunities for direct human connection.

As has been well-documented, occupational burnout is highly prevalent among physicians and is associated with many adverse consequences for physicians, patients, and the health care system as a whole.[5,6] Social isolation is closely tied to community, which is one of the key areas of worklife identified by Leiter and Maslach as associated with burnout.[7] Community contributes to fostering engagement and well-being when present but contributes to burnout and distress when suboptimal. The roles of social connection and support in physician well-being are also emphasized in the National Academy of Medicine consensus report on burnout and professional well-being and the US Surgeon General's Advisory on Building a Thriving Health Workforce.[6,8]

Although the relevance of social connection to well-being seems clear, social isolation among physicians and how it compares to levels in the general population is not well understood. Physicians work longer hours than the working general population[9,10] and commonly continue to work even on vacation time,[11] potentially limiting their ability to dedicate sufficient time to social connection. A recent study identified strong relationships between social isolation and burnout among residents and fellows,[12] but data on practicing physicians are scarce.[13] Therefore, we conducted a national survey to evaluate physician social isolation and its variation across physician demographics, its relationships with burnout, professional fulfillment, suicidal ideation, and its extent relative to other US workers.

PARTICIPANTS AND METHODS

Participants

As previously published,[14] we deployed a survey of US physicians and other workers between November 20, 2020, and March 23, 2021. Study methodology was similar to that of our prior surveys in 2011, 2014, and 2017. Details concerning the responding samples and study instruments are outlined in the prior publications and in the Supplemental Methods (available online at http://www.mayoclinicproceedings.org). Among the 3671 physicians who received an invitation to participate in the mailed survey, 1162 (31.7%) completed the survey. Of the 90,000 physicians invited to participate in the electronic survey, 6348 (7.1%) completed the survey.[14] Of note, a secondary survey of nonresponders indicated that participants were broadly representative with respect to demographics, single-item emotional exhaustion and depersonalization scores, overall burnout prevalence, and satisfaction with work-life integration.[14] Physician participants randomly received one of two subsurveys, one of which included the items on social isolation used for this report. Participation was voluntary and responses were anonymous. Additional details regarding the survey of nonphysician US workers in other fields have been previously reported[14] and are also provided in the Supplemental Methods. The Mayo Clinic and Stanford Institutional Review Boards approved the study, which followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines.

Study Measures

Physician surveys contained items about personal (age, gender, race, ethnicity [Hispanic or Latino/a origin], relationship status) and professional (work hours per week, nights on call per week, specialty, practice setting) factors as well as standardized instruments to assess burnout, professional fulfillment, suicidal ideation, and social isolation.

Burnout was measured using the complete 9-item emotional exhaustion and 5-item depersonalization subscales of the Maslach Burnout Inventory, used under license with Mind Garden, Inc. Response options for items in both scales are on a 7-point frequency scale from 0 ("never") to 6 ("every day"). Physicians with high emotional exhaustion ($\geq$27) and/or high

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TABLE 1. Personal and Professional Characteristics and PROMIS Social Isolation T-score Among Participating Physicians (n=3103)[a]

Characteristics	No. of participants	Social isolation T-score[b]	*P*
Age, y			<.001
<35	91 (3.0)	48.1 ± 9.0	
35-44	549 (18.3)	50.7 ± 9.2	
45-54	826 (27.5)	49.1 ± 9.2	
55-64	948 (31.6)	48.2 ± 9.1	
≥65	586 (19.5)	44.9 ± 8.7	
Missing	103		
Gender			<.001
Woman	1172 (37.9)	49.7 ± 8.8	
Man	1918 (62.0)	47.4 ± 9.3	
Other	3 (0.1)	53.5 ± 16.3	
Missing	10		
Race/ethnicity			0.25
Non-Hispanic White	1764 (71.2)	48.6 ± 8.9	
Non-Hispanic Black/African American	82 (3.3)	48.6 ± 10.0	
Non-Hispanic Alaskan and Asian Pacific Islander	331 (13.4)	49.5 ± 9.3	
Non-Hispanic Indigenous/Other	95 (3.8)	48.2 ± 10.5	
Non-Hispanic 2+ races	52 (2.1)	50.5 ± 9.6	
Hispanic/Latino	152 (6.1)	47.8 ± 8.9	
Missing	627		
Relationship status			<.001
Single	340 (11.0)	51.7 ± 9.2	
Married	2567 (83.1)	47.7 ± 9.1	
Partnered	140 (4.5)	50.8 ± 8.8	
Widowed or Widower	43 (1.4)	45.6 ± 10.0	
Missing	13		
Have children/age (y) of youngest child			<.001
No children	444 (14.3)	51.0 ± 9.2	
<5	311 (10.0)	49.6 ± 9.2	
5-12	552 (17.8)	49.8 ± 9.0	
13-18	453 (14.6)	47.9 ± 9.2	
19-22	328 (10.6)	47.7 ± 9.2	
>22	1008 (32.6)	46.2 ± 8.9	
Missing	7		
Specialty			<.001
Anesthesiology	149 (4.8)	49.5 ± 8.7	
Dermatology	88 (2.9)	44.7 ± 8.9	
Emergency medicine	164 (5.3)	49.3 ± 9.2	
Family medicine	197 (6.4)	47.7 ± 9.5	
General surgery	104 (3.4)	49.9 ± 9.1	
General surgery subspecialty	240 (7.8)	47.2 ± 9.2	
Internal medicine-general	207 (6.7)	48.1 ± 9.3	
Internal medicine subspecialty	294 (9.6)	48.1 ± 8.8	
Neurology	125 (4.1)	48.2 ± 9.6	
Neurosurgery	28 (0.9)	48.4 ± 10.7	
Obstetrics and gynecology	131 (4.3)	48.9 ± 9.3	
Ophthalmology	135 (4.4)	45.6 ± 8.2	
Orthopedic surgery	166 (5.4)	47.2 ± 9.5	
Other	35 (1.1)	50.4 ± 7.3	
Otolaryngology	191 (6.2)	47.3 ± 9.4	
Pathology	79 (2.6)	51.2 ± 9.3	

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TABLE 1. Continued

Characteristics	No. of participants	Social isolation T-score[b]	*P*
Specialty, continued			
Pediatrics-general	169 (5.5)	48.2 ± 8.8	
Pediatrics subspecialty	99 (3.2)	50.0 ± 8.7	
Physical medicine and rehabilitation	74 (2.4)	50.8 ± 9.3	
Preventive/occupational medicine	13 (0.4)	48.5 ± 11.3	
Psychiatry	230 (7.5)	49.0 ± 9.6	
Radiation oncology	20 (0.6)	44.9 ± 7.9	
Radiology	123 (4.0)	50.0 ± 9.1	
Urology	17 (0.6)	46.6 ± 6.7	
Missing	25		
Years in practice			<.001
<5	237 (7.9)	49.6 ± 8.9	
5 to <10	298 (9.9)	50.7 ± 9.6	
10 to <20	762 (25.4)	49.6 ± 9.3	
20 to <30	837 (27.9)	48.6 ± 9.2	
≥30	863 (28.8)	45.5 ± 8.7	
Missing	106		
Hours worked per week			<.001
<40	643 (20.8)	46.9 ± 9.1	
40-49	698 (22.6)	47.9 ± 9.2	
50-59	760 (24.6)	48.8 ± 8.8	
60-69	634 (20.6)	48.9 ± 9.4	
70-79	165 (5.4)	49.6 ± 9.9	
≥80	184 (6.0)	49.3 ± 9.7	
Missing	19		
Primary practice setting			<.001
Private practice	1790 (57.9)	47.6 ± 9.4	
Academic medical center	866 (28.0)	49.0 ± 8.7	
Veterans' hospital	55 (1.8)	52.0 ± 9.1	
Active military practice	14 (0.5)	50.2 ± 9.4	
Other	366 (11.8)	49.0 ± 9.3	
Missing	12		

[a]Values are n (%) or mean ± SD.
[b]Higher scores indicate higher social isolation (unfavorable).

depersonalization (≥10) scores were considered to have symptoms of burnout.[15] Professional fulfillment was measured using the professional fulfillment subscale of the Stanford Professional Fulfillment Index, scaled to a 0-10 range.[16] Professional fulfillment scores were also categorized by distribution, with those in the highest quartile considered to have high professional fulfillment and those in the lowest quartile considered to have low professional fulfillment.

To assess suicidal ideation, participants were asked, "During the past 12 months, have you had thoughts of taking your own life?" Originally developed by Meehan et al,[17] this item assesses recent but not necessarily active suicidal ideation. It has been used in multiple previous studies of physicians.[18-20]

Social isolation was assessed using the 4-item short form Patient-Reported Outcomes Measurement Information System (PROMIS) social isolation instrument.[21] Response options are on a 5-point scale from 1 ("never") to 5 ("always"). Higher scores indicate higher (more unfavorable) levels of social isolation. For most PROMIS instruments a nationally normed T-score of 50 is set to the average of the US general

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TABLE 2. Multivariable Linear Regression Analyses of Factors Associated with i) Emotional Exhaustion, ii) Depersonalization, and iii) Professional Fulfillment

Predictor	Beta (95% CI)	*P* value	Overall *P* value
i) Dependent Variable: Emotional Exhaustion (0-54 scale)			
Social Isolation T-score (each 1-point change)	0.63 (0.58–0.68)	–	<.001
Age (years)	−0.14 (−0.18-(−0.10))	–	<.001
Gender (vs. Man)			<.001
Woman	2.06 (1.08-3.04)	<.001	
Other	6.09 (−10.10-22.29)	.46	
Relationship Status (vs. Single)			.02
Married	−0.97 (−2.40-0.46)	.18	
Partnered	1.04 (−1.38-3.45)	.40	
Widowed/Widower	−4.08 (−7.37-(−0.80))	.02	
Hours worked per week (for each additional hour)	0.14 (0.11-0.17)		<.001
Specialty (vs. Internal Medicine Subspecialty)			<.001
Anesthesiology	−1.74 (−3.99-0.52)	.13	
Dermatology	1.87 (−1.16-4.91)	.23	
Emergency Medicine	3.84 (1.47-6.20)	.001	
Family Medicine	2.41 (0.29-4.54)	.03	
General Surgery	−1.77 (−4.21-0.67)	.16	
General Surgery Subspecialty	−1.94 (−3.89-(0.01))	.05	
Internal Medicine-General	2.61 (0.44-4.78)	.02	
Neurology	0.67 (−1.79-3.14)	.59	
Neurosurgery	0.95 (−4.52-6.43)	.73	
Obstetrics and gynecology	−0.46 (−2.75-1.83)	.70	
Ophthalmology	0.09 (−2.24-2.43)	.94	
Orthopedic Surgery	−0.10 (−2.20-2.00)	.93	
Other	0.32 (−1.89-2.52)	.78	
Otolaryngology	1.46 (−2.80-5.71)	.50	
Pathology	−1.41 (−4.39-1.57)	.35	
Pediatrics Subspecialty	−1.84 (−4.45-0.77)	.17	
Pediatrics-General	0.90 (−1.29-3.10)	.42	
Physical Medicine and Rehabilitation	1.11 (−1.72-3.94)	.44	
Preventive/Occupational Medicine	−3.62 (−10.52-3.28)	.30	
Psychiatry	1.05 (−0.90-3.01)	.29	
Radiation Oncology	−0.07 (−3.96-3.82)	.97	
Radiology	1.04 (−1.37-3.46)	.40	
Urology	3.75 (−2.36-9.86)	.23	
Practice Setting (vs. Private Practice)			<.001
Academic Medical Center	−3.13 (−4.11-(−2.15))	<.001	
Veterans' Hospital	−1.63 (−4.96-1.70)	.34	
Active Military Practice	1.82 (−3.40-7.05)	.49	
Other	−2.18 (−3.51-(−0.84))	.001	
ii) Dependent Variable: Depersonalization (0-30 scale)			
Social Isolation T-score (each 1-point change)	0.24 (0.21-0.26)	–	<.001
Age (years)	−0.10 (−0.12-(−0.08))	–	<.001
Gender (vs. Male)			.11
Female	−0.48 (−0.94-(−0.02))	.04	
Other	0.50 (−1.87-2.88)	.68	
Relationship Status (vs. Single)			.003
Married	−0.56 (−1.27-0.16)	.13	

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TABLE 2. Continued

Predictor	Beta (95% CI)	*P* value	Overall *P* value
Relationship Status (vs. Single), continued			
Partnered	0.88 (−0.45-2.21)	.20	
Widowed/Widower	−1.74 (−2.93-(−0.54))	.004	
Hours worked per week (for each additional hour)	0.03 (0.02-0.04)	−-	<.001
Specialty (vs. Internal Medicine Subspecialty)			<.001
Anesthesiology	−0.48 (−1.58-0.62)	.40	
Dermatology	1.09 (−0.34-2.52)	.14	
Emergency Medicine	4.02 (2.76-5.29)	<.001	
Family Medicine	1.54 (0.51-2.57)	.003	
General Surgery	−0.42 (−1.58-0.74)	0.48	
General Surgery Subspecialty	−0.27 (−1.15-0.61)	.54	
Internal Medicine-General	0.51 (−0.47-1.49)	.31	
Neurology	0.40 (−0.77-1.57)	.50	
Neurosurgery	2.48 (−0.62-5.57)	.12	
Obstetrics and gynecology	−0.32 (−1.33-0.69)	.53	
Ophthalmology	0.14 (−0.84-1.12)	.78	
Orthopedic Surgery	0.88 (−0.15-1.91)	.09	
Other	0.44 (−0.58-1.45)	.40	
Otolaryngology	2.03 (0.18-3.88)	.03	
Pathology	−2.07 (−3.26-(−0.88)	<.001	
Pediatrics Subspecialty	−1.07 (−2.21-0.06)	.06	
Pediatrics-General	−0.59 (−1.53-0.35)	.22	
Physical Medicine and Rehabilitation	0.33 (−1.17-1.84)	.66	
Preventive/Occupational Medicine	−2.08 (−4.71-0.55)	.12	
Psychiatry	0.09 (−0.83-1.00)	.85	
Radiation Oncology	−0.36 (−3.16-2.44)	.80	
Radiology	−0.24 (−1.37-0.89)	.68	
Urology	2.82 (0.18-5.45)	.04	
Practice Setting (vs. Private Practice)			<.001
Academic Medical Center	−1.30 (−1.77-(−0.83))	<.001	
Veterans' Hospital	−0.11 (−1.70-1.49)	.90	
Active Military Practice	−2.15 (−5.19-0.89)	.17	
Other	−0.55 (−1.18-0.08)	.09	
iii) Dependent Variable: Professional Fulfillment (0-10 scale)			
Social Isolation T-score (each 1-point change)	−0.11 (−0.12-(−0.10))	−-	<.001
Age (years)	0.02 (0.01-0.03)	−-	<.001
Gender (vs. Male)			.24
Female	−0.11 (−0.27-0.05)	.19	
Other	−1.68 (−4.68-1.32)	.27	
Relationship Status (vs. Single)			.01
Married	0.26 (0.02-0.51)	.04	
Partnered	−0.002 (−0.44-0.44)	.99	
Widowed/Widower	0.76 (0.26-1.25)	.003	
Hours worked per week (for each additional hour)	0.003 (−0.002-0.008)	−-	.26
Specialty (vs. Internal Medicine Subspecialty)			<.001
Anesthesiology	−0.36 (−0.75-0.25)	.07	
Dermatology	−0.06 (−0.53-0.41)	.79	
Emergency Medicine	−0.57 (−0.96-(−0.19))	.004	
Family Medicine	−0.36 (−0.74-0.01)	.06	

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TABLE 2. Continued

Predictor	Beta (95% CI)	*P* value	Overall *P* value
Specialty (vs. Internal Medicine Subspecialty), continued			
General Surgery	−0.02 (−0.42-0.38)	.91	
General Surgery Subspecialty	0.15 (−0.17-0.46)	.37	
Internal Medicine-General	−0.41 (−0.76-(−0.06))	.02	
Neurology	−0.39 (−0.80-0.02)	.07	
Neurosurgery	−0.60 (−1.46-0.25)	.17	
Obstetrics and gynecology	0.17 (−0.21-0.54)	.38	
Ophthalmology	0.11 (−0.28-0.50)	.59	
Orthopedic Surgery	−0.26 (−0.62-0.10)	.16	
Other	−0.06 (−0.41-0.30)	.76	
Otolaryngology	−0.42 (−1.08-0.24)	.21	
Pathology	−0.17 (−0.68-0.34)	.51	
Pediatrics Subspecialty	−0.01 (−0.44-0.42)	.98	
Pediatrics-General	−0.21 (−0.55-0.12)	.22	
Physical Medicine and Rehabilitation	−0.38 (−0.93-0.17)	.17	
Preventive/Occupational Medicine	−0.28 (−1.19-0.63)	.55	
Psychiatry	−0.10 (−0.44-0.24)	.56	
Radiation Oncology	0.24 (−0.43-0.92)	.48	
Radiology	−0.88 (−1.29-(−0.47))	<.001	
Urology	−0.12 (−0.84-0.60)	.75	
Practice Setting (vs. Private Practice)			.01
Academic Medical Center	0.27 (0.11-0.43)	.001	
Veterans' Hospital	−0.26 (−0.76-0.25)	.32	
Active Military Practice	−0.06 (−1.11-1.00)	.92	
Other	0.11 (−0.12-0.33)	.35	

population, with each 10-point interval equating to 1 SD. However, for social health instruments such as the social isolation measures, calibration samples were enriched for individuals with chronic illness so they reflect somewhat sicker participants than the general population.[21] Group differences of 2 or more T-score points have been suggested as representing a minimal important threshold for PROMIS instruments.[22] In the present study, the survey of workers in other fields included one item from the 4-item PROMIS instrument regarding feelings at work ("I feel isolated from others") to allow comparison of physician responses to other US workers.

Statistical Analysis

We calculated standard descriptive summary statistics and explored associations between variables using Kruskal-Wallis or χ^2 tests. We applied linear regression to identify factors associated with social isolation T-scores. We used multivariable linear regression to identify factors independently associated with emotional exhaustion, depersonalization, and professional fulfillment scores. We used multivariable logistic regression analysis to identify factors independently associated with burnout, the lowest (most unfavorable) quartile of professional fulfillment, and suicidal ideation. The multivariable models included demographics (age, gender, relationship status) and practice characteristics (work hours per week, nights on call per week, specialty, practice setting) previously shown to relate to burnout risk,[5,6] and social isolation T-score.

For all comparisons of physicians to the US working population, data were restricted to nonretired physician responders who

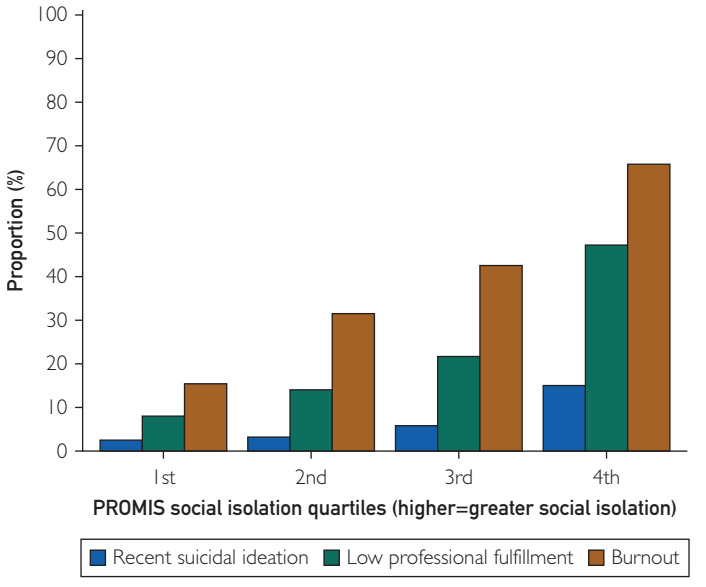

FIGURE. Relationship of social isolation scores with burnout, professional fulfillment, and suicidal ideation (low professional fulfillment indicated by score in lowest quartile). PROMIS = Patient-Reported Outcomes Measurement Information System).

were 29 to 65 years of age to match the age distribution of the surveyed population sample. Differences between the physician and population samples were analyzed using Wilcoxon rank sum tests for continuous variables and χ^2 tests for categorical variables. Multivariable ordinal logistic regression was used to compare the responses from physicians and the US working population for the single social isolation item, controlling for personal and professional characteristics. All tests were two-sided with type I error set to .05. All analyses were completed using SAS, version 9.4.

RESULTS

Of the 3237 physicians invited to complete the subsurvey including the PROMIS social isolation instrument, 3103 (95.9%) completed these items. The mean ± SD T-score was 48.2 ± 9.2. Mean T-scores by demographic and professional characteristics are shown in Table 1. Social isolation was higher for women physicians than men physicians (mean score, 49.7 vs 47.4; $P<.001$). Apart from lower social isolation scores in the small group of physicians younger than 35 years of age, scores were highest (unfavorable) among physicians 35-44 years of age and became more favorable with age thereafter; scores were also more favorable with more years in practice after the first 5 years. Scores were lower among married physicians and higher for physicians without children or whose youngest child was 12 years of age and younger than for those with older children. Social isolation did not statistically differ across race and ethnicity categories. With respect to work and professional characteristics, social isolation scores were higher among physicians with higher weekly work hours and lowest for physicians in private practice. Scores also varied across medical specialties, with the highest scores in pathology, physical medicine and rehabilitation, radiology, pediatric subspecialties, and general surgery and lowest scores in dermatology, radiation oncology, and ophthalmology. In multivariable linear regression including age, gender, relationship status, hours worked per week, practice setting, and specialty (Supplemental Table 1, available online at http://www.mayoclinicproceedings.org), social isolation T-score was higher among women physicians ($\beta=1.28$; $P<.001$), decreased with age after 35 years of age, and was lower among married vs single physicians ($\beta=-2.78$; $P<.001$). Social isolation T-score increased by 0.04 for each additional hour worked weekly ($P<.001$). Scores were highest among pathologists and lowest among dermatologists.

The relationships between social isolation scores and burnout, professional fulfillment, and suicidal ideation are shown in Table 2, Supplemental Tables 2-5 (available online at http://www.mayoclinicproceedings.org), the Figure, and Supplemental Figures 1 and 2 (available online at http://www.mayoclinicproceedings.org). Higher (unfavorable) social isolation scores were associated with higher levels of emotional exhaustion and depersonalization and with symptoms of overall burnout. In particular, 65.7% of physicians in the highest-quartile (unfavorable) social isolation score group

TABLE 3. Multivariable Ordinal Logistic Regression Analysis of Social Isolation for Physicians versus the General Working Population

Predictor	OR (95% CI)	*P*	Overall *P*
Physician (vs general working population)	1.28 (1.15-1.43)	—	<.001
Age, y	0.99 (0.98-0.99)	—	<.001
Woman (vs man)	1.23 (1.11-1.37)	—	<.001
Relationship status (vs single)			<.001
Married	0.71 (0.62-0.81)	<.001	
Partnered	1.12 (0.86-1.45)	.39	
Widowed/widower	1.05 (0.65-1.72)	.83	
Hours worked per week (for each additional hour)	1.01 (1.01-1.01)	—	<.001

experienced overall burnout vs 15.3% among the lowest-quartile (favorable) social isolation score group ($P<.001$). Higher levels of social isolation were also associated with lower levels of professional fulfillment. Among physicians in the highest-quartile social isolation score group, 47.0% were in the lowest quartile of professional fulfillment compared with 7.7% among the lowest-quartile social isolation score group ($P<.001$). Similarly, 49.9% of physicians in the lowest-quartile social isolation score group were in the highest quartile of professional fulfillment vs 8.1% among the highest-quartile social isolation score group ($P<.001$). Suicidal ideation was more common with greater degrees of social isolation, with 14.8% of physicians in the highest-quartile social isolation score group reporting suicidal ideation in the prior 12 months compared with 2.3% in the lowest-quartile social isolation score group ($P<.001$).

Multivariable analyses exploring the association of social isolation with burnout, professional fulfillment, and suicidal ideation adjusted for personal and professional factors are shown in Table 2 and Supplemental Table 2. For each 1-point higher (unfavorable) social isolation T-score, the emotional exhaustion score was 0.63 points higher on its 0-54 scale (95% CI, 0.58 to 0.68; $P<.001$), the depersonalization score was 0.24 points higher on its 0-30 scale (95% CI, 0.21 to 0.26: $P<.001$), and the professional fulfillment score was 0.11 points lower on its 0-10 scale (95% CI, −0.12 to −0.10; $P<.001$). For each 1-point higher (unfavorable) social isolation T-score, the odds of overall burnout were 10% higher (odds ratio [OR], 1.10; 95% CI, 1.09 to 1.12; $P<.001$), the odds of a lowest-quartile professional fulfillment level were 11% higher (OR, 1.11; 95% CI, 1.09 to 1.12; $P<.001$), the odds of a highest-quartile professional fulfillment level were 9% lower (OR, 0.91; 95% CI, 0.90 to 0.92; $P<.001$), and the odds of reporting suicidal ideation in the previous 12 months were 9% higher (OR, 1.09; 95% CI, 1.07 to 1.11; $P<.001$).

Finally, we compared responses of physicians to workers in other fields on the item from the PROMIS social isolation instrument included on the population survey of US workers in other fields ("I feel isolated from others"). Demographic differences between the physician and general population samples are shown in Supplemental Table 6 (available online at http://www.mayoclinicproceedings.org). A higher percentage of physicians than other workers indicated "always" and "usually" in response to the single-item social isolation measure (13.2% [n = 331 of 2504] vs 8.9% [n = 223 of 2506]; $P<.001$). Physicians remained more likely to report feeling isolated on this item relative to workers in other fields (OR, 1.28; 95% CI, 1.15 to 1.43; $P<.001$) after adjusting for age, gender, relationship status, and hours worked per week (Table 3).

DISCUSSION

This large national study of US physicians demonstrates that social isolation among

physicians was strongly associated with higher burnout, lower professional fulfillment, and suicidal ideation. Levels of social isolation were particularly high among women, early- and mid-career, and unmarried physicians, and were incrementally higher as weekly work hours increased. Social isolation was also reported by physicians to a greater extent than individuals in the general working population, a finding that persisted after adjusting for demographic factors and work characteristics.

Taken collectively, these results suggest that the broad attention to social isolation and loneliness for the US population called for by the Surgeon General is highly relevant for physicians. Incorporation of efforts to address social isolation should be an integral component of initiatives to promote health care professional well-being, such as those led by the National Academy of Medicine. The evidence base for solutions to reduce social isolation among physicians specifically is limited, and whether interventions to improve physician social isolation result in lower levels of burnout, greater professional fulfillment, or overall well-being is unclear. Even with these uncertainties, general recommendations to combat isolation and promote belonging seem advisable. These might include strengthening interpersonal connections within personal and family relationships, the community, and the workplace; emphasizing these values in leadership priorities; and normalizing discussion of social isolation and loneliness.[1,8,23-26] Specific approaches identified in the literature as potentially helpful include Colleagues Meeting to Promote and Sustain Satisfaction (COMPASS) groups comprising repeated small-group meetings organized around discussion topics relevant to the physician experience[27,28] and the "Battle Buddies" model of peer support.[29] Other simple and pragmatic approaches, such as the use of labeled surgical caps,[30] have been found to increase name acknowledgment and teamwork, and may help foster deeper interpersonal connections.

The heightened risk of social isolation observed among women physicians, those in early- and mid-career, and unmarried physicians suggests unique challenges with social isolation for these subgroups that may contribute to risk of burnout and other aspects of suboptimal well-being. Although these data are cross-sectional and cannot determine cause and effect, in addition to initiatives targeting professional well-being that might reduce social isolation, the design and evaluation of interventions to promote connection and reduce social isolation for both physicians in general and specifically for these groups appears warranted. As shown by the prior examples, such efforts targeting social isolation may lend themselves to relatively rapid implementation while other necessary interventions to address structural challenges in the health care delivery system are advanced.

The sources of increased social isolation among physicians are likely diverse, but long work hours, increasing productivity expectations, and substantial electronic medical record—related work burdens[31-34] that limit meaningful time with colleagues and time for personal relationships may contribute to disconnection. The impact of work on personal relationships is more adverse for physicians than for workers in other fields[35] and is associated with burnout and independently assessed patient experience and quality of care measures.[35,36] Erosion of professional connections among physicians in increasingly impersonal electronic practices is an important additional concern.[37] As telemedicine and virtual care become more common, attendant increases in physician social isolation should be anticipated.[38]

Study Limitations

First, response bias is a potential issue. Although prior analyses have supported the representativeness of the participating sample of US physicians,[14] the relationship between experiences of social isolation and study participation is unknown. Extrapolating this evidence should be done with caution and additional studies pursued to confirm and extend the findings. Second, due to cost constraints and the limited

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number of questions on the working population survey, we applied a single item from the PROMIS social isolation instrument for comparison of physicians to the US working population. Therefore, the current results do not offer a comprehensive comparison of social isolation and loneliness between physicians and other employed individuals. Third, a wide array of personal and work-related factors contributes to or detracts from physician well-being, with social isolation representing just one variable. Additional research is needed to fully delineate the associations among these factors and their relative contributions to well-being. Fourth, this survey took place during the COVID-19 pandemic. Although burnout levels were lower at this time than in past national studies,[14] it is not known whether physicians might have been more societally or professionally isolated due to their work roles. Finally, causal interpretations and the direction of the observed relationships cannot be determined from these cross-sectional data. For example, it seems likely that social isolation both contributes to and is exacerbated by burnout. The mechanisms underlying both directions of the relationships identified in this report merit further study.

CONCLUSION

This large national study found that social isolation in physicians is associated with increased risk of burnout and suicidal ideation as well as lower professional fulfillment. Physician subgroups with notably high degrees of social isolation such as women, early- and mid-career physicians, and physicians in certain specialties suggest populations to target for additional research on interventions to reduce social isolation and potentially improve well-being. Social isolation was also reported by physicians to a greater extent than workers in other fields. The professional demands and physicians' work hours limit time for social connection outside of work and may contribute to this challenge. These results align with recent calls to address social isolation and loneliness in the general population and support interventions to reduce isolation as part of efforts to promote physician well-being. Physicians have the same innate need for connection as all other human beings. Efforts by both organizations and physicians to prioritize and nurture personal and professional relationships and social connections may enhance well-being and physicians' ability to care for others.

POTENTIAL COMPETING INTERESTS

Dr West has received consulting fees from Marvin Behavioral Health Inc; and has received honoraria for presentations and providing advice for health care organizations. Dr Dyrbye has received honoraria for presentations and providing advice for health care organizations; and is co-inventor of Well-Being Index instruments (Mayo Clinic holds the copyright and has licensed them for use outside of Mayo Clinic — a portion of royalties is distributed to the co-inventors). Dr Trockel has received consulting fees from Marvin Behavioral Health Inc; and has received honoraria for presentations and providing advice for health care organizations. Dr Shanafelt has received honoraria for presentations and providing advice for health care organizations; and is co-inventor of Well-Being Index instruments and the Participatory Management Leadership Index (Mayo Clinic holds the copyright for each of these and has licensed them for use outside of Mayo Clinic — a portion of royalties is distributed to the co-inventor). All other authors report no competing interests.

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SUPPLEMENTAL ONLINE MATERIAL

Supplemental material can be found online at http://www.mayoclinicproceedings.org.

Supplemental material attached to journal articles has not been edited, and the authors take responsibility for the accuracy of all data.

Abbreviations and Acronyms: **PROMIS**, Patient-Reported Outcomes Measurement Information System

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