



# Analysis of Depressive Symptoms and Perceived Impairment Among Physicians Across Intern Year

Lisa M. Meeks, PhD; Jennifer Cleary, MS; Adam Horwitz, PhD; Karina Pereira-Lima, PhD; Zhuo Zhao, MS; Yu Fang, MSE; Srijan Sen, MD, PhD

## Introduction

Resident physicians experience high levels of depressive symptoms.<sup>1</sup> While stigma and career concerns disincentivize help-seeking, this may also be associated with the normalization of depressive symptoms (eg, trouble sleeping, feeling down about oneself) during training, skewing residents' perception of their functioning.<sup>2</sup> Perceptions that symptoms are not serious is a commonly reported barrier to treatment even among individuals with suicidal ideation,<sup>3</sup> yet untreated depression presents clear risks to interns (eg, progression to suicidal ideation) and their patients (eg, increased risk for medical errors).<sup>4</sup>

To our knowledge, no studies have assessed the extent to which perceptions of impairment associated with depressive symptoms change with the start of residency. Thus, we used data from the Intern Health Study to assess changes in associations between depressive symptoms and perceived impairment prior to vs during intern year.

Author affiliations and article information are listed at the end of this article.

## Methods

This cohort study was approved by the University of Michigan institutional review board and followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline. All participants provided electronic informed consent. Intern Health Study recruitment procedures and study design are detailed in a prior publication.<sup>5</sup> Preinternship (June) and internship (September or December) depressive symptoms and impairment item data were obtained from the 2007 to 2018 cohorts. The Patient Health Questionnaire-9 (PHQ-9) is a validated self-report of depression symptoms corresponding to the *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) (DSM-IV) symptoms of clinical depression. Respondents reported symptom frequency over the previous 2 weeks (0 = never to 3 = nearly every day) for a total score of 0 to 27. Depression scores are categorized as minimal (0-4), mild (5-9), moderate (10-14), moderate to severe (15-19), and severe ( $\geq 20$ ). A single item corresponding to the *Diagnostic and Statistical Manual of Mental Disorders* (Fifth Edition) (DSM-5) clinically significant impairment criterion for major depression asked respondents to report the difficulty of performing social, occupational, and other important activities owing to these symptoms (0 = "have not experienced any depressive symptoms or no difficulty at all," 1 = "somewhat difficult," 2 = "very difficult," and 3 = "extremely difficult").<sup>6</sup> Race and ethnicity were self-reported in the questionnaire; available categories were Arab or Middle Eastern (added in 2016), Asian (eg, Indian or Chinese), Black or African American, Latino or Hispanic, multiracial, Native American, Pacific Islander, White, and other. Multiracial was used when respondents chose more than 1 race or ethnicity. Other races and ethnicities were those hand-entered by respondents. This information was assessed to investigate racial and ethnic disparities in training physician mental health.

To characterize associations among PHQ-9 scores, perceived impairment, and internship, we compared mean PHQ-9 scores within impairment categories before vs during internship via *t* tests and descriptive statistics conducted in R statistical software version 3.5.3 (R Project for Statistical Computing). We included assessments from interns with preinternship and 1 follow-up assessment

**Open Access.** This is an open access article distributed under the terms of the CC-BY License.

using the next-nearest assessment. All statistical tests were 2-sided using statistical significance cutoffs of  $P < .05$ . Data were analyzed from January to November 2021.

### Results

Among 15 566 interns who provided data before and during internship, the mean (SD) age was 27.5 (2.7) years and there were 7985 (51.3%) women. There were 3331 Asian individuals (21.4%), 560 Black individuals (3.6%), 545 Latino or Hispanic individuals (3.5%), 1105 multiracial individuals (7.1%), 9495 White individuals (61.0%), and 530 individuals with other race or ethnicity (3.4%).

Mean (SD) PHQ-9 perceived scores associated with each perceived impairment category were significantly increased during internship compared with preinternship (no symptoms or no difficulty: 2.4 (2.4) vs 0.9 (1.4);  $t_{20\ 074} = 72.33$ ;  $P < .001$ ; somewhat difficult: 4.9 (3.2) vs 3.1 (2.2);  $t_{3794} = 28.98$ ;  $P < .001$ ; very difficult: 9.0 (4.1) vs 6.3 (3.7);  $t_{224} = 10.06$ ;  $P < .001$ ; extremely difficult: 14.2 (4.6) vs 9.4 (5.9);  $t_{67} = 6.57$ ;  $P < .001$ ) (Table). All median (IQR) during-internship measurements within each category were also significantly increased compared with preinternship measurements (no symptoms or no difficulty: 1.0 [0.0-3.0] vs 3.0 [2.0-6.0];  $P < .001$ ; somewhat difficult: 6.0 [3.0-9.0] vs 9.0 [6.0-12.0];  $P < .001$ ; very difficult: 9.5 [5.0-13.4] vs 14.0 [11.0-17.0];  $P < .001$ ; extremely difficult: 5.5 [1.0-15.0] vs 17.0 [14.0-20.8];  $P < .001$ ) (Figure). The median (IQR) for depressive symptom scores reported as very or extremely difficult prior to internship was similar to the median (IQR) for scores reported as somewhat difficult during internship (9.0 [3.0-14.0] vs 9.0 [6.0-12.0]).

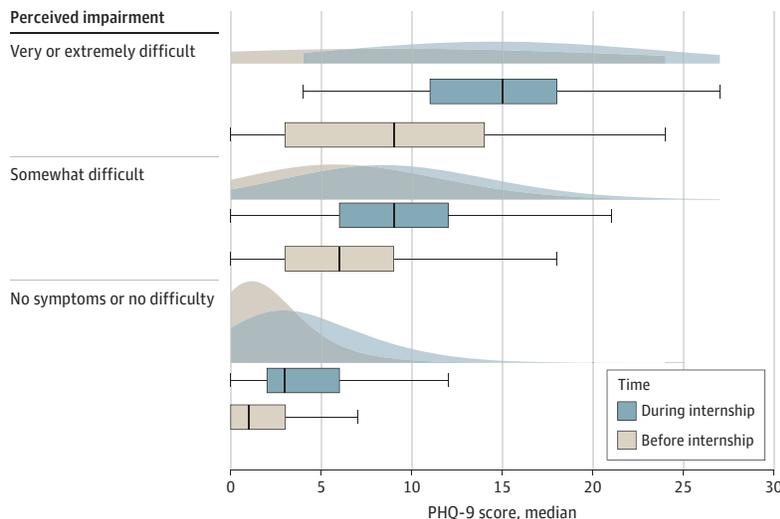
Table. PHQ-9 Depressive Symptoms Scores by Impairment Category

Perceived impairment level	PHQ-9 score, mean (SD)		Test statistic, $t^a$	df
	Preinternship	Internship		
No symptoms or no difficulty	0.9 (1.4)	2.4 (2.4)	72.33	20 074
Somewhat difficult	3.1 (2.2)	4.9 (3.2)	28.98	3794
Very difficult	6.3 (3.7)	9.0 (4.1)	10.06	224
Extremely difficult	9.4 (5.9)	14.2 (4.6)	6.57	67

Abbreviations: *df*, degrees of freedom; PHQ-9, Patient Health Questionnaire-9.

<sup>a</sup> All *P* values < .001.

Figure. Patient Health Questionnaire-9 (PHQ-9) Scores by Level of Perceived Impairment in Functioning



Shaded areas indicate distribution; vertical lines, medians; boxes, IQRs; whiskers, 95% CIs.

## Discussion

This cohort study of more than 15 000 interns found that the mean severity of depressive symptoms that interns viewed as functionally impairing during internship year was increased compared with preinternship. This may be associated with a rising bar, in which symptom severity previously described as very impairing is normalized after entering internship as being somewhat impairing. This potentially suggests a shift in interns' ability to recognize the impact of depressive symptoms<sup>2</sup> in the context of medical training. Limitations of this study include response biases (eg, fear of reporting any impairment) and nonrandom attrition that may limit generalizability.

Failure to perceive impairment carries implications for interns (eg, lack of help-seeking), training programs (eg, potential attrition of interns), and patient care (eg, disengagement and medical errors). Future research should investigate whether these discrepancies are associated with interns' ability to effectively cope or with failure to recognize impairment owing to symptom normalization; associations between impairment and help-seeking, including requests for disability accommodation; and whether personalized feedback on depressive symptoms and potential impairment is associated with recalibration of misperceptions. Recognizing impairment may be associated with decreased adverse outcomes, including medical errors<sup>3</sup> and attempted suicide among interns.

---

### ARTICLE INFORMATION

**Accepted for Publication:** November 28, 2021.

**Published:** January 25, 2022. doi:[10.1001/jamanetworkopen.2021.44919](https://doi.org/10.1001/jamanetworkopen.2021.44919)

**Open Access:** This is an open access article distributed under the terms of the [CC-BY License](https://creativecommons.org/licenses/by/4.0/). © 2022 Meeks LM et al. *JAMA Network Open*.

**Corresponding Author:** Lisa M. Meeks, PhD, Department of Family Medicine, University of Michigan Medical School, 1018 Fuller St, Ann Arbor, MI 48104-1213 ([meekslm@med.umich.edu](mailto:meekslm@med.umich.edu)).

**Author Affiliations:** Department of Family Medicine, University of Michigan Medical School, Ann Arbor (Meeks); Center for a Diverse Healthcare Workforce, School of Medicine, University of California, Davis, Sacramento (Meeks); Eisenberg Family Depression Center, University of Michigan, Ann Arbor (Cleary, Pereira-Lima, Zhao, Fang, Sen); Department of Psychology, University of Michigan, Ann Arbor (Cleary); Michigan Neuroscience Institute, University of Michigan, Ann Arbor (Cleary, Zhao, Fang, Sen); Department of Psychiatry, University of Michigan Medical School, Ann Arbor (Horwitz, Sen).

**Author Contributions:** Dr Meeks and Ms Cleary had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. These authors contributed equally to this work and share first authorship: Dr Meeks and Ms Cleary.

**Concept and design:** Meeks, Cleary, Horwitz, Sen.

**Acquisition, analysis, or interpretation of data:** All authors.

**Drafting of the manuscript:** Meeks, Cleary, Horwitz, Pereira-Lima, Zhao.

**Critical revision of the manuscript for important intellectual content:** Meeks, Cleary, Horwitz, Pereira-Lima, Fang, Sen.

**Statistical analysis:** Meeks, Cleary, Zhao, Fang.

**Obtained funding:** Meeks.

**Administrative, technical, or material support:** Zhao.

**Supervision:** Meeks, Sen.

**Conflict of Interest Disclosures:** None reported.

**Funding/Support:** This study was supported by grant R01 MH101459 from the National Institute of Mental Health to Dr Sen. Ms Cleary was supported by grant T32HD007109 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development. Dr Meeks was partially supported by grant UH1HP29965 from the Health Resources and Services Administration. Dr Horwitz was supported by grant KL2TRO02241 from the National Center for Advancing Translational Sciences. Dr Pereira-Lima was supported by grants 2018/21480-4 and 2016/13410-0 from the São Paulo Research Foundation.

**Role of the Funder/Sponsor:** The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

## REFERENCES

1. Guille C, Speller H, Laff R, Epperson CN, Sen S. Utilization and barriers to mental health services among depressed medical interns: a prospective multisite study. *J Grad Med Educ*. 2010;2(2):210-214. doi:10.4300/JGME-D-09-00086.1
2. Williford ML, Scarlet S, Meyers MO, et al. Multiple-institution comparison of resident and faculty perceptions of burnout and depression during surgical training. *JAMA Surg*. 2018;153(8):705-711. doi:10.1001/jamasurg.2018.0974
3. Horwitz AG, McGuire T, Busby DR, et al. Sociodemographic differences in barriers to mental health care among college students at elevated suicide risk. *J Affect Disord*. 2020;271:123-130. doi:10.1016/j.jad.2020.03.115
4. Pereira-Lima K, Mata DA, Loureiro SR, Crippa JA, Bolsoni LM, Sen S. Association between physician depressive symptoms and medical errors: a systematic review and meta-analysis. *JAMA Netw Open*. 2019;2(11):e1916097. doi:10.1001/jamanetworkopen.2019.16097
5. Sen S, Kranzler HR, Krystal JH, et al. A prospective cohort study investigating factors associated with depression during medical internship. *Arch Gen Psychiatry*. 2010;67(6):557-565. doi:10.1001/archgenpsychiatry.2010.41
6. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606-613. doi:10.1046/j.1525-1497.2001.016009606.x