

# Racial and Ethnic Diversity and Depression in Residency Programs: a Prospective Cohort Study

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## INTRODUCTION

Since the landmark *Regents of California v. Bakke* case in 1978, the Supreme Court has repeatedly upheld race-conscious admission policies based on the potential educational benefits of diversity. Within medical education, greater diversity also translates to a more diverse and culturally competent physician workforce—a critical factor for reducing broader healthcare disparities.<sup>1</sup> However, decades of efforts based on these justifications have yet to sufficiently increase the proportion of underrepresented minority (URM) medical trainees, prompting calls for further data to drive policy reforms.<sup>2, 3</sup> As medical training is a period characterized by high stress and risk for depression,<sup>4</sup> the relationship between program URM diversity and trainee well-being is a potentially important yet unexplored factor.

## METHODS

Interns from 38 institutions across 10 specialties were recruited via e-mail 2 months prior to beginning their internships in 2015 and 2016. Subjects completed web-based surveys that assessed depressive symptoms using the Patient Health Questionnaire-9 (PHQ-9, scores range from 0 to 27). Surveys were administered 1 to 2 months prior to internship (baseline) and then quarterly across intern year (60–76% response rate at each time point). A score of  $\geq 10$  on the PHQ-9 has a sensitivity and specificity of 88% for the diagnosis of major depression.<sup>5</sup> We restricted the analysis to participants who completed the baseline survey and at least one quarterly survey. Participants received \$50 in compensation.

The institutional review board at the University of Michigan approved the study.

Using multivariate linear regression, we assessed the association between the proportion of URM physicians in an intern class and the development of depressive symptoms ( $\text{PHQ-9}_{\Delta} = \text{PHQ-9}_{\text{internship mean}} - \text{PHQ-9}_{\text{baseline}}$ ) among the interns in that class. We restricted the analysis to residency programs for which data on at least five participants representing at least 60% of the program were available. Out of 61 potential residency programs, 38 met these criteria with subject participation rates ranging from 60 to 100%. Consistent with the AAMC definition, we considered anyone who identified as one or more of the following as a URM: Black/African-American, Hispanic/Latino, Arab/Middle Eastern, or Native-American.<sup>2</sup> We also adjusted for factors previously associated with resident depressive symptoms, including sex, work hours, history of depression, difficult early family environment (measured using the Risky Families Questionnaire, which assesses the relation of family stress to mental health), and neuroticism (measured using the NEO-Five Factor Inventory, which assesses the personality trait characterized by low mood and emotional vulnerability).<sup>4</sup>

## RESULTS

Within the sample of 1132 interns (47.2% female; mean age 27.5), 58.1% identified as White, 21.9% Asian, 15.1% URM, and 4.9% non-URM multi-racial (Table 1). These sample demographics are similar, though not identical, to the larger resident population.<sup>2</sup>

We found that a higher proportion of URM interns in a respondent's class associated with a smaller increase in PHQ-9 scores during internship overall ( $b = -0.23, p < .001$ ; Table 2A). Greater URM representation protected against depression for URM interns ( $b = -0.29, p < .001$ ; Table 2B) as well as non-URM interns, including those identifying as White ( $b = -0.19, p < .001$ ; Table 2C), Asian ( $b = -0.27, p < .001$ ; Table 2D), and non-URM multi-racial ( $b = -0.29, p < .001$ ; Table 2E).

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**Table 1 Demographic and Clinical Characteristics of Study Participants**

<b>Age (M ± SD)</b>	27.5 ± 2.6
<b>Female (n; %)</b>	534; 47.2%
<b>Race/Ethnicity (n; %)</b>	
White	658; 58.1%
Asian	248; 21.9%
Black/African-American	54; 4.8%
Hispanic/Latino	50; 4.4%
Arab/Middle Eastern	12; 1.1%
Native-American	1; 0.1%
URM Multi-racial	53; 4.7%
Non-URM Multi-racial	56; 4.9%
<b>Specialty (%)</b>	
Internal Medicine	57.8%
Surgery	16.6%
Ob/Gyn	3.7%
Pediatrics	8.6%
Psychiatry	1.9%
Emergency Medicine	6.2%
Med/Peds	0.9%
Family Practice	1.8%
‘other’	2.7%
<b>Weekly work hours (M ± SD)</b>	62.4 ± 13.1
<b>Prior history of depression (Yes; %)</b>	515; 45.5%
<b>Difficult early family environment (M ± SD)</b>	12.9 ± 9.2
<b>Neuroticism (M ± SD)</b>	22.0 ± 9.1
<b>PHQ-9 Baseline Scores (M ± SD; %≥10), p=.83</b>	
URM (n=170)	2.8 ± 3.1; 5.8%
White (n=658)	2.7 ± 3.1; 4.0%
Asian (n=248)	2.7 ± 3.1; 4.4%
Non-URM Multi-Racial (n=56)	2.8 ± 2.6; 1.7%

Sample included 1132 interns in 38 programs (Northeast 12, Midwest 10, South 10, and West 6)

## DISCUSSION

Prior research on medical student body diversity indicates that students of all backgrounds may experience educational benefits from diversity.<sup>6</sup> Our findings build on this work by demonstrating that greater URM diversity within a residency program associates with reduced risk of depression for both minority and majority racial groups. This has significant implications for medicine, as well as other educational and professional settings, particularly in a time when race-conscious admissions policies are under increasing scrutiny.

One study limitation is that PHQ-9 scores may be under-reported as depression is stigmatized among physicians. In addition, our sample’s reported history of depression exceeds that of the general population, which may limit the generalizability of the sample.

Until now, the long-term goal of reducing broader health-care disparities has served as the primary rationale for increasing URM trainee enrollment. Yet, progress in this area continues to lag.<sup>2, 3</sup> While additional work is needed to determine if the association between URM diversity and depression represents a causal relationship, this new evidence signals the importance of further investigation of the more immediate implications of URM diversity on trainee well-being. Further, this research provides additional justification to reform exist-

**Table 2 URM Program Diversity and Change in Depressive Symptoms**

	<i>b</i> (95% CI)	<i>p</i> -value
<b>A: All (n=1132)</b>		
% of URM	-0.23 (-0.26 - -0.21)	<.001
Female	0.13 (-0.49 - 0.75)	.68
Weekly work hours	0.02 (-0.001 - 0.05)	.06
Age	-0.003 (-0.12 - 0.11)	.96
Prior history of depression	-0.28 (-0.93 - 0.36)	.39
Difficult early family environment	-0.01 (-0.04 - 0.03)	.63
Neuroticism	0.02 (-0.02 - 0.05)	.34
<b>B: URM (n=170)</b>		
% of URM	-0.29 (-0.35 - -0.23)	<.001
Female	0.50 (-0.91 - 1.90)	.49
Weekly work hours	0.01 (-0.04 - 0.07)	.60
Age	-0.08 (-0.34 - 0.17)	.51
Prior history of depression	-0.01 (-1.52 - 1.50)	.99
Difficult early family environment	0.03 (-0.10 - 0.03)	.30
Neuroticism	-0.02 (-0.11 - 0.06)	.56
<b>C: White (n=658)</b>		
% of URM	-0.19 (-0.22 - -0.15)	<.001
Female	0.35 (-0.49 - 1.12)	.44
Weekly work hours	0.03 (0.01 - 0.06)	.02
Age	0.05 (-0.10 - 0.19)	.52
Prior history of depression	-0.40 (-1.25 - 0.44)	.35
Difficult early family environment	0.02 (-0.03 - 0.07)	.42
Neuroticism	0.04 (-0.1 - 0.09)	.11
<b>D: Asian (n=248)</b>		
% of URM	-0.27 (-0.33 - -0.21)	<.001
Female	-1.46 (-2.90 - 0.02)	.05
Weekly work hours	0.001 (-0.05 - 0.06)	.97
Age	-0.15 (-0.50 - 0.16)	.35
Prior history of depression	-0.38 (-1.89 - 1.24)	.62
Difficult early family environment	-0.01 (-0.08 - 0.06)	.74
Neuroticism	0.04 (-0.04 - 0.12)	.31
<b>E: Non-URM Multi-Racial (n=56)</b>		
% of URM	-0.29 (-0.43 - -0.15)	<.001
Female	3.10 (-0.30 - 6.50)	.07
Weekly work hours	-0.06 (-0.17 - 0.06)	.31
Age	0.01 (-0.64 - 0.66)	.10
Prior history of depression	1.91 (-1.43 - 5.24)	.26
Difficult early family environment	-0.01 (-0.20 - 0.18)	.91
Neuroticism	-0.05 (-0.20 - 0.09)	.47

*b* = slope; this value represents the slope of the line between the PHQ-9 $\Delta$  and the proportion of URM interns

ing policies and more effectively address the persistent racial and ethnic disparities within medicine.

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**Data Availability** The datasets during and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Compliance with Ethical Standards:

The institutional review board at the University of Michigan approved the study.

**Conflict of Interest:** The authors declare that they do not have a conflict of interest.

**Disclaimer:** The sponsors had no involvement in the study design, collection, analysis, or interpretation of data or writing of the manuscript. The content of this study is solely the responsibility of the authors and does not necessarily represent the official views of the sponsors.

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