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Association between perceived medical school diversity climate and change in depressive symptoms among medical students: A Report from the Medical Student CHANGE Study

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Abstract

Purpose—To determine whether perceptions of the medical school diversity climate are associated with depression symptoms among medical students.

Methods—Longitudinal web-based survey conducted in the fall of 2010 and spring of 2014 administered to a national sample of medical students enrolled in 49 schools across the U.S. (n=3756). Negative diversity climate measured by perceptions of the institution's racial climate; exposure to negative role modeling by medical educators; frequency of witnessing discrimination in medical school. Depression symptoms measured by the PROMIS Emotional Distress–Depression Short-Form.

Results—64% of students reported a negative racial climate; 81% reported witnessing discrimination toward other students at least once, and 94% reported witnessing negative role modeling. Negative racial climate, witnessed discrimination, and negative role modeling were independently and significantly associated with an increase in depression symptoms between baseline and follow-up. Adjusting for students' personal experiences of mistreatment, associations between depressive symptoms and negative racial climate and negative role modeling, remained significant (.72 [.51 to .93]; .33 [.12 to .54], respectively).

Conclusions—Among medical students, greater exposure to a negative medical school diversity climate was associated with an increase in self-reported depressive symptoms.

Keywords

diversity climate; racial climate; well-being; depressive symptoms; medical students

INTRODUCTION

There is long-standing evidence of psychological distress among medical students..^{1–3} Medical students exhibit a higher prevalence of depression than their age-matched counterparts.^{4,5} Furthermore, recent studies also show that minority medical students have a higher prevalence of depressive symptoms.^{2,3,5}

The role of socio-demographic variables such as race/ethnicity,² gender,² sexual orientation³ and body size⁴ on medical student mental well-being are previously documented. Stressful life events⁷, academic difficulties,^{7,8} clinical workload,^{7,8} and the hidden curriculum^{5–8} are associated with depression among medical students. Additionally, life-long exposure to discrimination and social isolation are associated with the training experience of racial/ethnic minority medical students.⁹

Studies on clinical workplace¹⁰ environment suggest that the medical school environment may also contribute to poor mental health. Racial/ethnic minority medical students may be particularly sensitive to the diversity climate,^{11,12} having experienced bias, discrimination, and stereotyping, which results in feelings of isolation, depression, and burnout.¹³ Nevertheless, very little research has directly examined the impact of the perceived medical school diversity climate on racial/ethnic students' well-being. Furthermore, studies that do

explore this topic are cross-sectional and cannot include the impact of these perceptions over time.¹⁴

Hurtado's model¹² elucidates the impact of the diversity climate within academic medicine. The current study advances the utility of this model, incorporating institutional-level context with personal experiences of mistreatment. Specifically, we sought to 1) characterize the medical school diversity climate in a national sample of medical schools, 2a) assess whether the diversity climate differentially affects depression symptom scores among racial/ethnic minority and white students and 2b) assess whether negative diversity climate is associated with increased depression symptom scores among medical students overall. We hypothesized that a negative (i.e. inequitable) medical school diversity climate would have a detrimental effect on medical students' mental health, particularly racial/ethnic minority students.

METHODS

This study was approved by the Institutional Review Boards of the [INSTITUTION NAMES OMITTED FOR REVIEW]. Participants were asked to read the on-line consent form on the first page of the survey (see eSurvey in the Supplement for more detail on the consent process and language).

Sample

The Medical Student Cognitive Habits and Growth Evaluation (CHANGE) Study is a longitudinal study of medical students who matriculated in US medical schools in the fall of 2010. We randomly selected 50 medical schools from strata of public/private schools and 6 regions of the country, using sample proportional to strata size methodology. One sampled school had highly unique characteristics (military school) that would have limited the generalizability of our study findings and was excluded, leaving a sample of 49 schools (for more information please see van Ryn et al, 2015¹⁵).

Measures

Dependent Variable—Depression symptoms were assessed at baseline and follow-up using six items from the Patient Reported Outcomes Measurement Information System (PROMIS) Emotional Distress–Depression Short Form 8b. The PROMIS Depression Short form is a validated assessment of depression symptoms that was selected due to its superior measurement precision and its extensive testing within a number of settings and patient populations.¹⁶ It is intended to assess variation in symptom level rather than a clinical “case” or diagnosis. As per the PROMIS scoring manual, we standardized raw scores so that a score of 50 represents the average score of the general population of the United States, with 10 as the standard deviation.¹⁷ For reference, a 3.0–4.5 point change in PROMIS depression symptom score has been found to represent a minimally important difference (i.e., a difference in score that is large enough to have implications for a respondents' treatment or care).¹⁸

Independent variables—We assessed student's perceptions of their medical school diversity climate at follow-up (year four) using three previously validated measures. 1) We assessed students' perception of their institution's racial climate¹⁹ by asking to what extent they disagreed or agreed (using 7-point Likert scale) with six statements (refer to Table 2 for specific item wording). We reverse coded the last three items so that all items were in the same negative direction, and created an overall variable of each student's mean response across the six items (Cronbach's alpha=.73); a higher mean score represents a more negative racial climate. 2) Students' exposure to negative role modeling²⁰ by medical educators was assessed by asking students how often they heard/witnessed professors, instructors, attendings and/or residents make negative comments, disparaging remarks, or jokes about black patients, women patients, poor patients, and obese patients. Students responded on a five-point Likert frequency scale: never (coded as 0), rarely, sometimes, often, and very often (coded as 4). We created an overall variable of each student's mean response (Cronbach's alpha=.88). 3) Students were asked to report the perceived frequency with which they witnessed discrimination¹⁰ toward other students (refer to Table 2 for specific item wording). Students responded on a five-point Likert frequency scale: never (coded as 0), once, occasionally, often, and very often (coded as 4). We created an overall variable of each student's mean response across the six items (Cronbach's alpha =.90). Because the racial climate variables were measured on different scales, we standardized them to have a mean of zero and standard deviation of one, easing interpretation.

Two versions of race/ethnicity were used depending on the purpose of analyses, described below. 1) White vs all others and 2) Black, Hispanic, Asian and White. Participants self-reported their race based on fixed categories. Participants were instructed to "choose all that apply" from the following options: *American Indian/Alaska Native; East Asian; South Asian; Black; Native Hawaiian/Pacific Islander; White; Unknown*. They were also instructed to select *Hispanic/Latino; Not Hispanic/Latino; or Unknown* for their ethnicity.

Covariates—All models included baseline depression symptoms as well as student age, gender, relationship status and family household income (when students were in high school) and medical school geographic region and public or private. Age and family income were dichotomized at their median scores. School information was obtained from publicly available data.¹¹ All covariates were selected based on a priori frameworks.

Since it was possible that any association between students' perception of the medical school diversity climate and their mental health might be spurious and due to both variables being associated with their personal exposures to discrimination in medical school we also adjusted for students' personal experiences of mistreatment (refer to Table 3 for specific item wording). This scale came from a previously published measure in the Association of American Medical College (AAMC) Medical School Graduation Questionnaire (GQ).¹¹ We created an overall variable of each student's mean response, (Cronbach's alpha=.81); where a higher mean score represents more experiences of mistreatment

Analysis

The socio-demographic characteristics of the CHANGE study sample have been published previously.^{2,3,6} For this study, we calculated descriptive statistics for minority and white students, and computed Pearson chi-square statistics to determine whether there were race/ethnicity differences in student gender, age, family income, or relationship status. To characterize students' medical school diversity climate exposures, we calculated the response frequencies for each item, assessing racial climate, negative role modeling, and witnessed discrimination.

Given the hierarchical nature of the data (i.e., students nested within schools), we fit multilevel linear regression models with a random school intercept. To examine the association between the diversity climate and depression symptoms for students overall, we fit four models. In model 1 (climate model), we estimated the independent associations between the three medical school diversity climate measures (negative racial climate, negative role modeling, and witnessed discrimination) and depression symptoms at follow-up. To account for potential confounding of these associations by students' personal experiences, we fit a second model (climate + experiences model) in which we added the measure of students' personal experiences of mistreatment. In model 3 (climate + covariate model), we estimated the association between the diversity climate and depression symptoms, controlling for individual-level (race/ethnicity, gender, age, income, relationship status) and school-level covariates (public versus private, geographic region). In model 4 (climate + experiences + covariate model), we estimated the association between the diversity climate and depression symptoms, controlling for students' personal experiences of mistreatment, as well as individual- and school-level covariates.

Finally, we estimated the difference in the association between racial climate and depression symptoms, as well as negative role modeling and depression symptoms, by race/ethnicity. Specifically, we re-fit model 4 (climate + experiences + covariates model) and included interaction terms to separately examine the difference in slopes between white and all other students, Black and all other students, Hispanic and all other students, and Asian and all other students. We created linear prediction plots for each interaction model (Figure 1).

All models adjusted for depression symptoms at baseline. A two-sided significance threshold was set a priori at $p=.05$. Missing cases were dropped from the analyses (maximum missingness: 4.7%). Analyses were conducted using Stata, version 12 and/or version 14.

RESULTS

In the fall of 2010, we invited 5,823 first year students from the 49 sampled schools (67.8% of all first year medical students attending sampled schools) into the study. Of these, 4,732 completed the baseline survey (81.3% of students invited into the study and 55.1% of the entire pool of first year medical students at the 49 study schools). Four years later, using a response rate maximization strategy, including \$50 compensation, we received completed follow-up surveys from 3,959 students. Students who were not in their 4th year of medical school for any reason (usually due to delaying attendance for a life event or pursuing another

degree simultaneously) were excluded (n=203), leaving complete longitudinal data for 3,756 students (79% response rate). For greater detail regarding study recruitment and sampling, see van Ryn 2015¹² for sample flowchart.

Sample—62% of students in the study identified as non-Hispanic white, 5% identified as non-Hispanic Black, 5% identified as Hispanic, and 23% identified as non-Hispanic Asian. Characteristics of the sample are shown in Table 1. 37% of students experienced a worsening of depression symptoms between their first and fourth years of medical school (for more detail on these students, see Supplement eFigure 1 and eFigure 2. Racial/ethnic minority and white students were significantly different in terms of all sociodemographic characteristics (Table 1), with minority students being more likely to be female, younger, single, and more likely to report that their annual family income in high school was less than \$100,000.

The distribution of responses on measures of the medical school diversity climate is shown in Table 2. Overall, 64% of students in the sample reported any amount of exposure to a negative racial climate at their medical school; 81% of students reported witnessing any type of discrimination toward other students at least once, and 94% reported witnessing at least one type of negative role modeling during medical school. Most (95%) of students reported experiencing at least one type of mistreatment during medical school, as shown in Table 3.

The estimates obtained by fitting multilevel linear regression models are shown in Table 4. Coefficients represent the change in depression symptom scores associated with each standard deviation increase in students' mean response on a particular exposure variable, accounting for the remaining predictors in the model. The climate model (model 1) showed that each of the three climate measures – negative racial climate, witnessed discrimination, and negative role modeling – was independently and significantly associated with an increase in depression symptoms between baseline and follow-up (respective coefficients and 95% confidence intervals: 1.05 [.84 to 1.26]; .86 [.67 to 1.06]; and .56 [.34 to .77]). For example, students who reported a negative racial climate score at their medical school that was two standard deviations above the sample mean had depression symptom scores that were approximately four points higher than students who reported a racial climate that was two standard deviations below the sample mean. For reference, Yost et al.¹⁸, found that a 3.0–4.5 point difference in PROMIS depression scores represented a minimally important difference (i.e., a difference in score that is large enough to have implications for a respondents' treatment or care). In the climate + experiences model (model 2), we found that the association between a negative racial climate and depression symptoms (coef: .82 [.61 to 1.02]), as well as negative role modeling and depression symptoms (coef: .30 [.09 to .51]), remained significant after adjusting for students' personal experiences of mistreatment. However, witnessed discrimination was no longer statistically significantly associated with increased depression symptom scores at follow-up once personal experiences of mistreatment was added to the model. These findings persisted after adjusting for individual- and school-level covariates (models 3 & 4).

Figure 1 showed the linear prediction plots (i.e., fitted regression lines from the interaction models) for the difference in association between racial climate and depression symptoms by

race/ethnicity. The association between negative racial climate and depression symptoms did not differ significantly for white compared to all other students (Panel A; interaction coefficient: $-.01$; 95% CI $[-.37$ to $.36]$), nor for black students when compared to all other students (Panel B; interaction coefficient: $-.42$ $[-1.05$ to $.20]$). We did, however, find that a more negative racial climate was significantly associated with a less detrimental change in depression symptoms score among Hispanic students when compared to all other students (Panel C; interaction coefficient: $-.89$ $[-1.63$ to $-.15]$), while it was significantly associated with a more detrimental change in depression symptom scores among Asian students when compared to all other students (Panel D; interaction coefficient: $.55$ $[.12$ to $.98]$). We did not find any significant differences by race/ethnicity between negative role modeling and depression symptoms.

CONCLUSIONS

In our large longitudinal sample of medical students attending a stratified random sample of US medical schools, negative medical school diversity climate was associated with depression symptoms not just for students from racial/ethnic minority groups but for *all* medical students. A majority of students also reported at least some degree of a negative diversity climate at their medical school.

The finding that a negative diversity climate within medical schools was associated with a greater risk of depression symptoms for all students is concerning. Poor well-being among medical students has been linked to both personal negative outcomes (e.g. burnout, suicidal ideation and substance-abuse) and decrements in quality of care provided.²³ This study extends prior research on well-being among medical students, which tended to focus primarily on individual-level factors that contribute to poor well-being, suggesting that, in addition to personal causes, students must also contend with institutional level factors that contribute to their mental health outcomes.

Recent studies have found that medical students from underrepresented social groups in medicine are at greater risk for depression in medical school.^{2,3} One might expect that a negative diversity climate would be more damaging for students from racial/ethnic minority groups, particularly Black and Hispanic students, than for students from majority groups. However, the present results suggest that an inequitable medical school environment is harmful for all students, with strongest effects among Asian students. It seems likely that such a climate fosters alienation among racial/ethnic minority students, but it may also feel unwelcoming for majority group members, interfere with the provision of peer support, or signal insecurity.²⁴ A negative diversity climate may also reflect a poor climate overall. Future studies must examine the reasons negative diversity climate relates to well-being among both marginalized and advantaged groups, including the possibility that the pathways are different among different groups.

The relationship between an inequitable medical school diversity climate and depression symptoms may also be concerning because the associated values and behaviors become part of the “hidden curriculum” - the content conveyed through the hidden transmission of the dominant culture of medicine.^{9,25} Medical students may gradually adopt this professional

culture and its value system as their own.⁹ In this way, school negative diversity climate may contribute to the formation of a professional identity that results in students' perpetuating negative diversity climates in their practice settings with resulting negative effects on both their well-being and on the provision of equitable and high-quality care.

Creating an institutional environment that is fair, equitable and inclusive is vital to maintaining the health and well-being of all medical students. In order to do so, medical schools must seek to systematically document and understand the aspects of their institutional climate that contribute to both equity and inequity. Conversations that often take place at a very general or broad level around structural or institutional racism, sexism, etc, must become more focused in order to demonstrate how pervasive the value system and culture of some medical training institutions are and how this value system manifests itself on an individual level in the health of its trainees. While it is often believed that diversity initiatives should be and are targeted specifically at supporting the needs of people of color,²⁶ the findings of this study suggest that addressing a negative diversity climate will be beneficial to all medical students.

This study had several limitations; however, to our knowledge it is the only longitudinal study that has been able to examine the relationship between the diversity climate and the well-being of medical students. First, while sample characteristics were similar to those of all medical students matriculating in U.S. medical schools in their class, findings may not generalize to medical students outside of our sample. Respondents may differ systematically from non-responders such that the relationship between negative diversity climate and depression symptoms differs between respondent and non-respondents. Student characteristics that were not assessed in the CHANGE study, including academic difficulties and other personal issues, may have affected both perceptions of the diversity climate and depressive symptoms. However, our ability to adjust for baseline depression symptoms and the finding that the diversity climate impacted all students helps to minimize this concern.

Among medical students, greater exposure to a negative medical school diversity climate was associated with an increase in self-reported depressive symptoms between the 1st and 4th year of medical school. Further research is needed to understand whether this relationship is causal, and if so, to understand the mechanism.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. Association between negative racial climate and depression by race/ethnicity (n=3,756), CHANGE Study 2010–2014

Notes:

Linear prediction plots obtained from fitting multilevel linear regression models with a random school intercept and interaction terms.

Models adjusted for depression at baseline, race, ethnicity, gender, age, income, relationship status, public versus private, and geographic region.

The range of possible depression symptom scores in this sample is 38–80. A higher depression symptom score represents more of the concept being measured. A 3.0–4.5 point change in PROMIS depression score represents a minimally important difference.

Standardized negative racial climate scores represent the number of standard deviations from the sample mean of zero.

Table 1
Demographic characteristics of sample medical students by race (n=3,756), CHANGE 1 Study 2010–2014.

Variable	Overall		Racial/ethnic minority students ^a		White students		χ^2 statistic	p-value
	n	%	n	%	n	%		
<i>Gender ^b</i>							9.87	.002
Male	1,873/3,756	50	657/1,411	47	1,216/2,345	52		
Female	1,883/3,756	50	754/1,411	53	1,129/2,345	48		
<i>Age ^{b, c}</i>							3.85	.050
23 or younger	2,146/3,756	57	835/1,411	59	1,311/2,345	56		
24 or older	1,610/3,756	43	576/1,411	41	1,034/2,345	44		
<i>Family annual income in high school ^{c, d}</i>							48.89	<.001
Less than \$100,000	1,635/3,648	45	706/1,349	52	929/2,299	40		
\$100,000 or more	2,013/3,648	55	643/1,349	48	1,370/2,299	60		
<i>Relationship status ^d</i>							96.23	<.001
Single	1,192/3,695	32	579/1,377	42	613/2,318	27		
In a relationship	2,503/3,695	68	798/1,377	58	1,705/2,318	74		
<i>School type ^b</i>							13.94	<.001
Public	1,369/3,756	36	552/1,411	39	817/2,345	35		
Private	2,387/3,756	64	859/1,411	61	1,528/2,345	65		
<i>Geographic region ^b</i>							48.07	<.001
Northeast	914/3,756	24	352/1,411	25	562/2,345	24		
Southeast	799/3,756	21	263/1,411	19	536/2,345	23		
Central South	590/3,756	16	220/1,411	16	370/2,345	16		
Midwest	1,062/3,756	28	397/1,411	28	665/2,345	28		
Southwest	246/3,756	7	123/1,411	9	123/2,345	5		
Northwest	145/3,756	4	56/1,411	4	89/2,345	4		
<i>Depression symptoms</i>							2.55	.11
Depressive symptom scores worsened	1,392/3,739	37	537/1,399	38	855/2,340	37		
Depressive symptom scores improved	2,347/3,739	63	862/1,399	62	1,485/2,340	63		

Note:

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Percentages may not sum to 100 due to rounding.
Students who indicated a race other than white and/or a non-Hispanic ethnicity
Assessed at baseline
Variables dichotomized at the sample median
Assessed at follow-up

Student assessment of medical school diversity climate (n=3,756), CHANGE Study 2010–2014

Table 2

RACIAL CLIMATE Scale Mean (standard deviation): 2.83 (1.04)	Strongly disagree	Moderately/slightly disagree	Neither agree nor disagree	Moderately/slightly agree	Strongly agree
<i>Please indicate to what extent you disagree or agree with the following statements about your medical school experience</i>					
I have witnessed racial insensitivity from other students (n=3,662)	643 18%	684 19%	340 9%	1,663 45%	332 9%
I have witnessed racial insensitivity from faculty (n=3,659)	796 22%	931 25%	473 13%	1,231 34%	228 6%
The interracial climate on this campus is tense (n=3,661)	1,759 48%	1,321 36%	330 9%	217 6%	34 1%
The medical school makes a genuine effort to recruit racial and ethnic minority students ^a (n=3,659)	111 3%	278 8%	528 14%	1,604 44%	1,134 31%
The medical school fosters respect for cultural differences ^a (n=3,660)	41 1%	117 3%	268 7%	1,780 49%	1,454 40%
The medical school has made a special effort to help racial and ethnic minority students feel like they 'belong' on campus ^a (n=3,656)	89 2%	221 6%	823 23%	1,521 42%	1,005 28%
Students who endorsed any extent of negative racial climate at their medical school	2,334/3,663 64%				
WITNESSED DISCRIMINATION Scale Mean (standard deviation): 1.10 (0.75)	Never	Once	Occasionally	Often/very often	
<i>In medical school, how often did you witness or hear about another student(s) having each of the following experiences and either believe or wonder if it might be because of their race, ethnicity, gender, sexual orientation, obesity, poverty level, and/or disability?</i>					
Given lower evaluation or grades for unfair or unjust reasons - rather than performance? (n=3,677)	1,649 45%	483 13%	1,235 34%	310 8%	
Treated in an unfriendly way, as if they were not welcome? (n=3,676)	1,148 31%	408 11%	1,662 45%	458 13%	
Subjected to offensive remarks/names? (n=3,677)	1,698 46%	641 17%	1,173 32%	165 5%	
Treated with less respect than other medical students? (n=3,676)	1,446 39%	526 14%	1,476 40%	228 6%	
Publicly humiliated? (n=3,677)	1,744 47%	590 16%	1,132 31%	211 6%	
Ignored by resident or attending physicians? (n=3,675)	1,038 28%	243 7%	1,504 41%	890 24%	

RACIAL CLIMATE Scale Mean (standard deviation): 2.83 (1.04)	Strongly disagree	Moderately/slightly disagree	Neither agree nor disagree	Moderately/slightly agree	Strongly agree
<i>Students who reported witnessing any type of discrimination at least once during medical school</i>			2,973/3,678 81%		
NEGATIVE ROLE MODELING Scale Mean (standard deviation): 1.21 (0.90)	Never		Rarely	Sometimes	Often/very often
<i>During medical school, how often have you heard/witnessed professors, instructors, attendings and/or residents make negative comments, disparaging remarks, or jokes about...</i>					
Obese patients (n=3,664)	306 8%		535 15%	1,349 37%	1,474 40%
Poor patients (n=3,662)	978 27%		1,156 32%	1,007 28%	521 14%
Black patients (n=3,660)	1,787 49%		1,140 31%	546 15%	187 5%
Lesbian, gay, or bisexual patients (n=3,662)	1,778 49%		1,251 34%	493 14%	140 3%
Uneducated patients (n=3,659)	969 27%		1,015 28%	1,119 31%	556 15%
Disabled patients (n=3,660)	2,186 60%		1,055 29%	311 9%	108 3%
Women patients (n=3,662)	1,977 54%		1,071 29%	480 13%	134 4%
<i>Students who ever witnessed any type of negative role modeling during medical school (i.e., reported any type of negative role modeling rarely, sometimes or often/very often)</i>			3,443/3,665 94%		

Note:

Percentages may not sum to 100 due to rounding.

All items in Table 2 were assessed at follow-up.

^aThese items were reverse coded in calculating summative measures and generating the racial diversity exposure variable so that a more negative score represents a more negative racial climate.

Table 3

Frequency of students personally experiencing mistreatment in medical school (n=3,756), CHANGE Study 2010–2014

EXPERIENCED MISTREATMENT Scale Mean (standard deviation): 1.08 (0.69)	Never	Once	Occasionally	Often/very often
<i>During your years in medical school, how often were you:</i>				
Given lower evaluation or grades for unfair or unjust reasons - rather than performance? (n=3,690)	1,412 38%	1,018 28%	943 26%	317 9%
Treated in an unfriendly way, as if you were not welcome? (n=3,692)	738 20%	640 17%	1,862 50%	452 12%
Subjected to offensive remarks/names? (n=3,690)	2,326 63%	632 17%	653 18%	79 2%
Treated with less respect than other medical students? (n=3,691)	2,141 58%	699 19%	758 21%	93 3%
Publicly humiliated? (n=3,690)	2,256 61%	734 20%	626 17%	74 2%
Ignored by resident or attending physicians? (n=3,688)	503 14%	354 10%	2,013 55%	818 22%
<i>Students who reported experiencing any type of mistreatment at least once during medical school</i>	3,499/3,693 95%			

Note:

All items in Table 3 were assessed at follow-up.

Percentages may not sum to 100 due to rounding.

Table 4

Estimated associations between medical school diversity climate and depression among medical students (n=3,756), CHANGE Study 2010–2014

	Model 1			Model 2			Model 3			Model 4		
	Climate			Climate + Experiences			Climate + Covariates			Climate + Experiences + Covariates		
	<i>Coef^a</i> (95% CI)	<i>p-value</i>		<i>Coef^a</i> (95% CI)	<i>p-value</i>		<i>Coef^a</i> (95% CI)	<i>p-value</i>		<i>Coef^a</i> (95% CI)	<i>p-value</i>	
Negative racial climate ^b	1.05 (.84 to 1.26)	<.001		.82 (.61 to 1.02)	<.001		.95 (.74 to 1.16)	<.001		.72 (.51 to .93)	<.001	
Witnessed discrimination ^b	.86 (.67 to 1.06)	<.001		.07 (–1.14 to .29)	.50		.82 (.62 to 1.01)	<.001		.04 (–.17 to .25)	.71	
Negative role modeling ^b	.56 (.34 to .77)	<.001		.30 (.09 to .51)	.005		.59 (.38 to .80)	<.001		.33 (.12 to .54)	.002	
Experienced mistreatment ^b				1.88 (1.66 to 2.10)	<.001					1.85 (1.63 to 2.07)	<.001	
Depression @ Year 1	.40 (.38 to .42)	<.001		.37 (.35 to .40)	<.001		.40 (.37 to .42)	<.001		.36 (.34 to .38)	<.001	
White							–.140 (–.53 to .25)	.48		–.27 (–.65 to .12)	.17	
Female							–.36 (–.73 to –.00)	.05		–.13 (–.49 to .23)	.48	
Age >23							.71 (.34 to 1.08)	<.001		.52 (.16 to .89)	.005	
Family income < \$100,000							.42 (.05 to .79)	.03		.28 (–.08 to .64)	.13	
In a relationship							–1.61 (–2.00 to –1.22)	<.001		–1.60 (–1.99 to –1.22)	<.001	

Notes:

Estimates obtained by fitting multilevel linear regression models with a random school intercept.

Covariate models additionally adjusted for school-level (public versus private, geographic region) measures.

^a Coefficients should be interpreted as the estimated change in depression score associated with each standard deviation increase in the exposure measure, adjusting for the remaining variables in the model. For reference, a 3.0–4.5 point change in PROMIS depression symptom score represents a minimally important difference (i.e., a difference in score that is large enough to have implications for a respondents' treatment or care).³⁸

^b Standardized mean scores; higher score indicates that student reported greater exposure to construe