











Yearly and Daily Discrimination-Related Stressors and Mexican Youth's Mental Health and Sleep: Insights From the First Wave of a Three-Wave Family Study

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Objective: Research is needed to examine discrimination-related stressors and their social and psychological shaping of mental health and sleep outcomes of Latinx youth. The background, design, and methodology of a longitudinal study of Mexican families in Indiana and the initial findings of associations between discrimination-related stressors and youth mental health and sleep outcomes are presented.

Method: Initiating wave 1 of a 3-wave (yearly) longitudinal study, investigators surveyed an ethnically homogeneous sample of 344 Mexican-origin adolescents (ages 12-15) and their primary caregivers, assessing risks and protective factors for mental health and sleep outcomes. Youth also completed a one-time 21-day daily diary after wave 1. Self-reported measures of youth mental health, sleep, and discrimination across wave 1 and the daily diary were evaluated to compare the cross-sectional (wave 1) and daily associations between discrimination and youth mental health and sleep outcomes.

Results: Of youth, 88.1% reported at least one incident of lifetime discrimination. Almost one-third had elevated depressive symptoms, 44.5% had probable generalized anxiety disorder, and 50.9% had poor sleep quality. Between-youth correlations at wave 1 and in the daily diary were consistent in that perceived racial discrimination was positively correlated with worse mental health and poorer sleep quality. Smaller within-youth correlations were observed in the daily diary, but there was striking variability in the effect of discrimination across youth.

Conclusion: The present results illustrate the powerful methods of combining yearly and daily time data to investigate how and for whom discrimination-related stressors lead to adverse outcomes.

Plain language summary: Latinx youth are the largest and fastest growing minoritized youth group in the United States. This study surveyed 344 Mexican-origin adolescents and their primary caregivers to assess risk and protective factors for mental health and sleep outcomes. The authors found that 88.1% of youth reported at least one incident of lifetime discrimination, 29.7% reported elevated depressive symptoms, 44.5% reported elevated anxiety symptoms, and 50.9% reported poor sleep quality. Youth who experienced racial discrimination were more likely to have worse mental health and lower sleep quality than those who did not experience racial discrimination.

Diversity & Inclusion Statement: We worked to ensure that the study questionnaires were prepared in an inclusive way. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented racial and/or ethnic groups in science. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented sexual and/or gender groups in science. We actively worked to promote inclusion of historically underrepresented racial and/or ethnic groups in science in our author group. While citing references scientifically relevant for this work, we also actively worked to promote inclusion of historically underrepresented racial and/or ethnic groups in science in our reference list.

Clinical trial registration information: *Seguimos Avanzando* - Latino Youth Coping With Discrimination; <https://clinicaltrials.gov/NCT04875208>.

Key words: discrimination; Latinx families; mental health; Mexican youth; sleep

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There are more than 18 million Latinx youth younger than 18 in the United States,¹ making them the largest and fastest-growing minoritized youth group. Many youth experience striking mental health problems due to racial and ethnic discrimination, intercultural conflict, and adverse social interactions at school.^{2,3} Emerging research also shows that discrimination is associated with negative sleep outcomes, including shorter sleep

duration, poorer sleep quality, and more sleep irregularity.^{4,5} Racism- and discrimination-related stressors are prevalent in new migration areas, defined by a rapid influx of Latinx immigrants after 1990 and greater than 100% growth in a few decades.⁶ Latinx individuals may be marginalized and have limited access to educational opportunities and neighborhood safety.⁷ Immigration laws and policies in states such as Indiana, where anti-immigrant attitudes are common, can

produce a hostile environment with daily stressors and fears.^{8,9}

Experts studying race-based stress argue that daily experiences of discrimination, intercultural conflict, and unfair treatment have dynamic relations with psychological (eg, negative affect) and physiological (eg, sleep problems) processes that lead to adverse mental health outcomes.¹⁰⁻¹² Levy *et al.*¹³ articulated the Race-based Disparities in Stress and Sleep in Context model, one theoretical pillar of the current work. This model emphasizes the role of psychological responses to discrimination, with hypervigilance to anticipate discriminatory actions that leads to anger, depression, and negative feelings. The model also integrates the effect of race-based stress on biological responses, such as changes in sleep hours and quality, which are understudied pathways to the emergence of racial/ethnic disparities. A second pillar is the integrative risk and resilience model,¹⁴ which emphasizes the cognitive and affective experiences of racial and ethnic minoritized individuals' resilience to negative interactions, considering social context. Individual factors, such as socio-emotional capacities and social position, can help youth cope with distress, while experiences that threaten social position can impact mental health. Both models illustrate individual, family, and neighborhood mechanisms that lead to or mitigate the development of disparities.^{13,14} Nonetheless, few empirical studies document developmental dynamics over adolescence, taking into account individual, family, and community contexts. To our knowledge, few studies of discrimination and sleep include Latinx youth (none in new migration areas). Evidence shows sleep disruptions attributable to discrimination-related stressors.^{5,15}

In this article, we introduce an ambitious project called *Seguimos Avanzando*, which documents the developmental course of Mexican-origin youth and their caregivers in 2 Indiana counties with dramatic migration. The project uses a multi-timescale longitudinal design to shed light on patterns of stability and change in adolescence. It collects 3 annual waves of quantitative data about youth, their families, and their neighborhood context. It also includes daily diary data about adolescents' daily experiences, including reports of discrimination, daily stress, psychological states, and daily sleep patterns. The one-time diary study following wave 1 allows us to characterize heterogeneity in stress responses.

Overall Project Aims

The project has 3 primary aims:

- Determine within-person discrimination-related stressors that impact mental health outcomes and mechanisms of anger, hypervigilance, and perceived social position
- Identify protective factors against discrimination and the conditions under which they work

- Elucidate youth, parent, and neighborhood risk factors and acculturative stressors that moderate the link between discrimination-related stressors and mental health and sleep outcomes

In unreceptive environments, many youth are particularly vulnerable and hypervigilant¹⁶ to possible danger, fear, or discrimination stressors.^{17,18} Discrimination-related stressors can also affect perceptions of one's social position (perceived standing related to others) as a pathway to depression and anxiety symptoms.¹⁹ Not all who experience discrimination-related stressors fare poorly, as youth draw from coping resources such as ethnic identity commitment,^{20,21} social supports,^{22,23} family ethnic socialization,^{24,25} family cohesion,^{26,27} and neighborhood collective efficacy.²⁸ Conversely, distress within the family or neighborhood can exacerbate adverse mental health impacts of discrimination-related stressors on youth mental health. By identifying effective coping strategies and conditions under which they are most effective, *Seguimos Avanzando* seeks to inform multilevel prevention efforts.

In new migration areas, Latinx individuals are often portrayed as having criminal tendencies, perpetuating negative stereotypes and increasing marginalization.²⁹ Immigration, family tensions, and language can be significant stressors, while some family, peer, and school factors are protective.³⁰ Good quality sleep may support coping with subsequent discrimination,⁴ making sleep both a consequence and a protective factor.³¹ Few studies on discrimination and sleep among Latinx youth have focused on new migration areas.³² Previous research has not studied risk and protective factors among Latinx individuals living in a state with a predominantly White population,³³ and few studies used longitudinal designs³⁴ barring rare exceptions.³⁵⁻³⁷

Present Study

The present study has 3 goals within the project's overall aims. The first is to describe the design and methodology of wave 1, the daily diary, and the psychometrics of measures in a Mexican-American sample of youth and parents. The second is to present descriptive sociodemographic information and the prevalence of mental health, sleep problems, and experiences of discrimination at wave 1. The third is to provide the project's first empirical findings examining the cross-sectional and daily associations between discrimination-related stressors, the hypothesized social and psychological mechanisms, and youth mental health and sleep outcomes. Three additional articles under review examine the mediating and moderating effects in detail. In this article, we compare associations of discrimination with outcomes across wave 1 and the daily diary. Future reports will highlight longitudinal

patterns of stability and change in discrimination-related stressors and mental health and sleep outcomes in youth.

METHOD

Sampling

We recruited a sample of 344 youths ages 12 to 15 and, when possible, both a mother and a father caregiver figure

(labeled mother or father) (Table 1). Families were eligible if there was an adolescent 12 to 15 years old of Mexican descent, both caregivers were also of Mexican descent, and the adolescent resided with at least one of the consenting caregivers. Caregivers were defined as biological parents, legal guardians, stepparents, or anyone age 18 or older identified as a parent or guardian (eg, grandparents, siblings). Youth were excluded if they had a severe learning or

TABLE 1 Distribution of Sociodemographic, Mental Health, and Sleep Measures From Youth, Mothers, and Fathers in Wave 1 Survey

Baseline characteristic	Youth (n = 344)		Mother ^a (n = 335)		Father ^b (n = 176)	
	Mean (SD)		Mean (SD)		Mean (SD)	
Age, y	13.5 (1.1)		41.4 (6.4)		44.0 (7.8)	
	n (%)		n (%)		n (%)	
Gender						
Female	158 (45.9)		333 (99.4)		0 (0.0)	
Male	178 (51.7)		0 (0.0)		176 (100.0)	
Nonbinary/third gender	8 (2.3)		2 (0.6)		0 (0.0)	
Ethnicity						
Biethnic/multiethnic	3 (0.9)		0 (0.0)			
Mexican/Mexican American	338 (98.3)		334 (99.7)		175 (99.4)	
Other (Hispanic)	3 (0.9)		1 (0.3)		1 (0.6)	
Race						
American Indian	9 (2.6)		5 (1.5)		2 (1.1)	
Asian or Pacific Islander	1 (0.3)		2 (0.6)		1 (0.6)	
Black/African American	5 (1.5)		3 (0.9)		4 (2.3)	
Other (most said Mexican)	184 (53.5)		200 (59.7)		124 (70.5)	
White	27 (7.8)		113 (33.7)		35 (19.9)	
Refused	0 (0.0)		1 (0.3)		2 (1.1)	
Don't know	115 (33.4)		11 (3.3)		7 (4.0)	
Missing	3 (0.9)		0 (0.0)		1 (0.6)	
Birthplace						
Mexico	23 (6.7)		310 (92.5)		167 (94.9)	
United States	320 (93.0)		24 (7.2)		9 (5.1)	
Missing	1 (0.3)		1 (0.3)		0 (0.0)	
Family structure						
Single-mother family	46 (13.4)		NA		NA	
Other	20 (5.8)		NA		NA	
Two-parent family	277 (80.5)		NA		NA	
Missing	1 (0.3)		NA		NA	
Marital status						
Married	NA		211 (63.0)		145 (82.4)	
Separated	NA		48 (14.3)		7 (4.0)	
Unmarried	NA		76 (22.7)		24 (13.6)	
Interview mode						
In-person	257 (74.7)		252 (75.2)		108 (61.4)	
Paper	0 (0.0)		4 (1.2)		25 (14.2)	
Virtual/phone	87 (25.3)		79 (23.6)		43 (24.4)	

Note: NA = not applicable.

^aThe baseline interview was not completed by 9 mothers.

^bThe baseline interview was not completed by 168 fathers.

developmental disability or participated in a previous pilot study.

Procedures

Families were recruited at community-based organizations, churches, public events, and schools and through activities at youth organizations, radio stations, and local Latinx leaders from April 9, 2021, to December 22, 2022. Youth and their parents were invited to the wave 1 survey, which included questions about stress, discrimination, and efforts to overcome these difficult experiences. Youth were also asked to respond to the 21-day daily diary. Bilingual project staff, mostly Latinx, screened families for eligibility in person or by phone. Parents signed informed consent forms, and youth signed assent forms. Staff made referrals to bilingual mental health services when parents or youth endorsed suicidal ideation or requested services. Study procedures were approved by the main institutional review board and ceded by other participating institutions.

We collected data using an integrated yearly and daily design. The yearly method included a 3-wave longitudinal study at 9- to 14-month intervals. Wave 1 data collection ended on December 22, 2022. Data collection for waves 2 and 3 is ongoing. We programmed surveys in the Qualtrics platform (Qualtrics, Seattle, Washington) and administered them in the participant's preferred language (English or Spanish). Bilingual research assistants surveyed parents and facilitated youth surveys simultaneously but separately. Respondents could complete the wave 1 survey at different times to accommodate their schedules. Youth and their parents were surveyed at home, a designated community center, virtually, or via mailed surveys on rare occasions (Table 1). Each parent received \$35 and each youth received \$30 for completing the wave 1 survey.

A 21-day daily diary survey was completed by 317 of the 344 youths immediately after wave 1. Youth used Qualtrics on their own or with data-enabled tablets provided by study staff when families did not own a device. They were instructed to complete the survey every night between 6:00 PM and 2:00 AM. Youth received a survey link nightly at 6:00 PM via e-mail or text message and had 1 hour to complete the survey after clicking the link. If the survey were incomplete, a reminder was sent at 10:00 PM, and another message was sent at 2:00 AM informing the youth the day's window was closed. Parents received a Google Voice text reminder on the youth's first survey day. Youth received a payment of \$3 each day they completed the daily diary survey, plus a bonus of \$5 for answering each whole week and an additional \$10 for completing all 21 days (\$88 total).

Quality Control

We implemented an interview quality control system whereby audio recordings of each interviewer's first 2 interviews and a random 10% of all interviews conducted were checked for feedback via a standardized quality control form.

Study Measures and Psychometrics

Study surveys were available in English and Spanish, using measures with good psychometric properties. We conducted a multistep translation and adaptation process for measures unavailable in Spanish and systematically checked the psychometric quality of the data. For multiple-item measures in wave 1, we estimated McDonald ω , which has better properties than Cronbach α .³⁸ All measures in the diary assessed daily exposure by specifying the timing as "today." The one exception was the sleep measure, which specified the timing as "last night." The diary measures are essential for understanding the within-youth variation and the reliability of the in-person items to the measure. For diary measures with 2 or more items, we estimated the reliability of change using a psychometric generalizability theory approach.³⁹

Wave 1 measures for youth and parents are listed in Table S1 and Table S2, available online. When appropriate, parents reported on their own and their youth's mental health, while youth reported about themselves only. The mean (SD) time to complete the wave 1 survey was 91.01 (35.34), 108.11 (53.95), and 97.87 (46.35) minutes for youth, mothers, and fathers, respectively. Daily diary measures for youth are listed in Table S3, available online.

Youth-reported mental health and sleep outcomes at wave 1 included past 2-week depressive symptoms (Child Depression Inventory-2 Short Form [CDI-2]⁴⁰), past 3-month anxiety symptoms (Screen for Child Anxiety Related Emotional Disorders-Generalized Anxiety Disorder Subscale [SCARED-GAD]⁴¹), and past-month sleep quality (Pittsburgh Sleep Quality Index [PSQI] global scores⁴²) (Supplement 1, available online). Youth-reported mental health and sleep outcome measures assessing similar constructs in the 21-day diary included daily negative affect (5-item Negative Affect Scale of the Positive and Negative Affect Schedule-Short Form [PANAS-SF]⁴³), daily stress (adapted version of the 4-item Perceived Stress Scale [PSS]⁴⁴), and daily (last night) sleep quality (selected items from the PSQI⁴²) (Supplement 1, available online).

Youth-reported stressors included lifetime perceived racial discrimination (Perceptions of Racism in Children and Youth [PRaCY]⁴⁵) at wave 1 and daily perceived racial discrimination (4-item measure adapted from the

Racial-Ethnic Discrimination Index [REDI]⁴⁶) in the daily diary. We included 5 potential mechanisms of action at yearly and daily levels (youth-reported) that were common across survey instruments. At wave 1, these mechanisms included perceived social position (McArthur Social Position Ladder⁴⁷); emotion regulation (Emotion Regulation Questionnaire [ERQ]⁴⁸) in 2 ways, cognitive reappraisal (changing the way one thinks about potentially emotion-eliciting events) and expressive suppression (forced attempt not to express the discomfort); outward anger expression (Anger Expression-Out Subscale of the State-Trait Anger Expression Inventory-2 for Children and Adolescents [STAXI-2 C/A]⁴⁹), which measures youth expression of anger in an outwardly negative and poorly controlled manner; and racism-related vigilance (Heightened Vigilance Scale [HVS]⁵⁰), which measures heightened alertness in response to experiences of discrimination. In the daily diary, youth included daily perceived social position (McArthur Social Position Ladder⁴⁷), daily emotion regulation through cognitive reappraisal and expressive suppression (adapted version of the ERQ⁴⁸), daily outward anger expression (modified version of the 5-item Anger Affect Fixed Form Ages 8-17 v2.0 from the NIH Toolbox for Assessment of Neurological and Behavioral Function⁵¹), and daily racism-related vigilance (adapted version of the HVS⁵⁰).

Data Analysis

We used conventional descriptive statistics, including product-moment correlations, to report the wave 1 results and multiple imputation under the missing at random assumption for the few variables that were missing among respondents.⁵² Specifically, youth who self-reported their gender as nonbinary/third gender ($n = 8$) could not be assigned gender-normed T scores for youth-reported depressive symptoms (CDI-2) and youth-, mother-, and father-reported youth behavioral and emotional problems (Child Behavior Checklist Youth Self-Report [YSR] and Parent-Report [CBCL]). Multiple imputation allowed these youth to be represented in the summary statistics based on their other characteristics, including gender (Supplement 1, available online).

The diary data had a multilevel structure in which days were nested within youth. Thus, the observed correlations between variables from the daily diary can be decomposed into the between-youth and the within-youth correlations. The between-youth correlations were computed using youth-specific means of all diary reports. In contrast, the within-youth correlations were computed across daily reports, weighted by the number of days completed by each

youth. The between-youth correlations from the daily diary are comparable to the correlations from the survey at Wave 1. We use these to assess the coherence between youth yearly and daily reports of key variables.

To assess youth differences in response to daily perceived racial discrimination, we carried out a series of 4 multilevel modeling analyses in the daily diary data (with days nested within youth) that separately regressed stress, negative affect, sleep (outcomes), and perceived social position (one potential mechanism) on perceived racial discrimination. We standardized variables using within-youth means and standard deviations to facilitate comparisons.⁵³ Each outcome (eg, stress) and the potential mechanism were modeled as a function of perceived racial discrimination, and between-youth variability in the effect of discrimination was modeled as both a random intercept and a random slope. We interpret the random slopes as variation in the youth's reactivity to discrimination in terms of the 3 outcomes and one potential mechanism. To explore individual differences in reactivity, we obtained empirical Bayes estimates of the random slopes for each youth.⁵⁴ As time dependencies can arise due to repeated administration of the same measures, we conducted 2 sets of sensitivity analyses. In one, day of daily diary was included as a covariate to adjust for the linear effect of time. In another, within-youth residual errors were allowed to be correlated using an autoregressive variance structure of order 1. In both sets of sensitivity analyses, our results remained the same (Supplement 1, available online). All analyses and descriptive statistics were conducted using Stata software version 17.⁵⁵

RESULTS

Reliability of Measures

Most youth- and parent-reported measures at wave 1 demonstrated adequate reliability (ω coefficient >0.70). Excluding the few measures with $\omega \leq 0.70$ (3 youth, 4 mother, and 2 father measures), reliability coefficients ranged from 0.72 to 0.95 among youth, 0.75 to 0.95 among mothers, and 0.71 to 0.94 among fathers. In the daily diary, the different daily-level constructs all were reliably measured (>0.70) at the between-youth level (average of day-specific reliability coefficients across the diary days). At the within-youth level, a few measures were less consistent in measuring individual differences in change over days, as expected (Supplement 1, available online).

Sample Description

As shown in Table 1, 80.5% of the 344 youths resided in 2-parent families; 335 (97.4%) and 176 fathers (51.2%)

participated in wave 1, representing 167 youth–mother–father triads, 168 youth–mother dyads, and 9 youth–father dyads. The complete families ($n = 167$) were statistically similar to families in which only one parent was interviewed ($n = 177$) in almost all study measures (for the few exceptions, see Tables S4, S5, S6, and S7, available online). This supports the assumption that wave 1 data were missing at random.

Among the 344 youths in wave 1, 69 (20.1%) completed 0 to 7 days of diaries, 57 (16.6%) completed 8 to 14 days, and the majority (218 [63.4%]) completed at least 15 days. These 3 missingness groups were statistically similar in almost all wave 1 study variables (Tables S8, S9, S10, and S11, available online). Thus, the assumption of daily diary data missing at random was plausible.

Table 1 also shows that the mean (SD) ages of youth, mothers, and fathers were 13.5 (1.1) years, 41.4 (6.4) years, and 44.0 (7.8) years, respectively. Slightly more than half of the youth reported their gender as male (178 [51.7%]), and 2.3% ($n = 8$) reported their gender as nonbinary or third gender. Almost all participants (youths: 338 [98.3%]; mothers: 334 [99.7%]; fathers: 175 [99.4%]) reported their ethnicity as Mexican or Mexican American. The few participants who reported another ethnicity (6 youths, 1 mother, and 1 father) self-identified as Hispanic, biethnic, or multiethnic but later clarified as being of Mexican descent. When asked about their race (American Indian, Asian or Pacific Islander, Black/African American, White, Other, refused, don't know), most participants (youths: 184 [53.5%]; mothers: 200 [59.7%]; fathers: 124 [70.5%]) self-identified as other and specified Mexican. In addition, 155 (33.4%) youths said they did not know their race, and 113 (33.7%) mothers and 35 (19.9%) fathers reported their race as White. Almost all youth (320 [93.3%]) were born in the United States. In contrast, nearly all mothers (310 [92.5%]) and fathers (167 [94.9%]) were born in Mexico. Three-fourths of youth and mothers completed the wave 1 interview in person in contrast to 61.4% of fathers.

Wave 1 Prevalence of Mental Health, Sleep, and Discrimination Measures

Nearly one-third (29.7%) of youth reported elevated or highly elevated depressive symptoms in the past 2 weeks, according to the CDI-2 (Table 2). In contrast, 90.4% of mothers and 94.9% of fathers reported mild to minimal depression per the Patient Health Questionnaire-9 (PHQ-9). We observed a similar pattern for anxiety symptoms, with 44.5% of youth reporting past 3-month symptoms of probable generalized anxiety disorder (GAD) (SCARED-GAD). In contrast, 82.0% of mothers and 93.8% of fathers reported mild to minimal anxiety symptoms in the past 2

weeks (Generalized Anxiety Disorder-7 [GAD-7]). Youth scored a mean of 5.5 (3.0) in the PSQI; more than half of the sample (50.9%) was categorized as having poor sleep quality, and 7.3% self-reported symptoms indicative of a probable sleep disorder (global PSQI scores >10).

Parents rated the past 6 months emotional and behavioral problems of their children less severely than the youth did. Compared with 17.8% of youth (YSR), 3.6% of mothers and 1.2% of fathers reported their youth behavioral and emotional problems in the borderline to clinical range (CBCL).

Self-reported experiences of lifetime discrimination were common. From the PRaCY measure, 88.1% of youth reported at least one incident of lifetime discrimination. Among parents, 53.1% of mothers and 50.0% of fathers reported at least one experience of discrimination a few times a year from the Everyday Discrimination Scale (EDS). Similarly, 68.0% of youth, 70.4% of mothers, and 69.3% of fathers reported at least one experience of vicarious racism a few times a year from the Vicarious Experiences of Racism Scale (VERS).

Observed Correlations Between Study Variables

Table 3 shows the correlations among wave 1 variables that are the focus of the present study. Perceived racial discrimination was positively correlated with expressive suppression ($r = 0.14, p = .01$); anger and racism-related vigilance ($r = 0.21, p < .001$; $r = 0.39, p < .001$); and depressive symptoms, anxiety symptoms, and sleep quality ($r = 0.36, p < .001$; $r = 0.30, p < .001$; $r = 0.31, p < .001$). In contrast, discrimination was not significantly correlated with perceived social position ($r = -0.08, p = .13$). Further, expressive suppression, anger, racism-related vigilance, depressive symptoms, anxiety symptoms, and poor sleep quality all were positively correlated with each other (except for expressive suppression with anger). These correlations were the strongest between depressive and anxiety symptoms ($r = 0.54, p < .001$) and between depressive symptoms and poor sleep quality ($r = 0.53, p < .001$). Higher perceived social position was negatively correlated with depressive symptoms ($r = -0.20, p < .001$), anxiety symptoms ($r = -0.19, p < .001$), and poorer sleep quality ($r = -0.20, p < .001$).

Table 4 presents correlations among diary variables comparable to the wave 1 survey variables in Table 3. The between-youth correlations, shown in the lower triangle, were generally consistent with those from wave 1 in terms of both direction and magnitude. Specifically, perceived racial discrimination was positively correlated with anger and racism-related vigilance ($r = 0.31, p < .001$; $r = 0.38, p < .001$) and negative affect, stress, and sleep ($r = 0.29, p < .001$; $r = 0.16, p = .005$; $r = 0.23, p < .001$). It was not correlated, however, with cognitive reappraisal or expressive

TABLE 2 Descriptive Statistics of Mental Health, Sleep, and Discrimination Measures From Youth, Mothers, and Fathers in Wave 1 Survey

Wave 1 measure	Youth (n = 344)		Mother ^a (n = 335)		Father ^b (n = 176)	
	n	(%)	n	(%)	n	(%)
Depressive symptoms						
Youth (CDI-2)						
Average or lower (CDI-2 ≤ 59)	186	(54.2)	NA		NA	
High average (60 ≤ CDI-2 ≤ 64)	56	(16.1)	NA		NA	
Elevated (65 ≤ CDI-2 ≤ 69)	31	(9.0)	NA		NA	
Very elevated (CDI-2 ≥ 70)	71	(20.7)	NA		NA	
Parents (PHQ-9)						
Minimal depression (PHQ-9 ≤ 4)	NA		201	(60.0)	145	(82.4)
Mild depression (5 ≤ PHQ-9 ≤ 9)	NA		102	(30.4)	22	(12.5)
Moderate depression (10 ≤ PHQ-9 ≤ 14)	NA		22	(6.6)	8	(4.5)
Moderately severe depression (15 ≤ PHQ-9 ≤ 19)	NA		5	(1.5)	1	(0.6)
Severe depression (PHQ-9 ≥ 20)	NA		5	(1.5)	0	(0.0)
Anxiety symptoms						
Youth (SCARED-GAD)						
No GAD (SCARED-GAD ≤ 8)	191	(55.5)	NA		NA	
Probable GAD (SCARED-GAD ≥ 9)	153	(44.5)	NA		NA	
Parents (GAD-7)						
Minimal anxiety (GAD-7 ≤ 4)	NA		169	(50.4)	132	(75.0)
Mild anxiety (5 ≤ GAD-7 ≤ 9)	NA		106	(31.6)	33	(18.8)
Moderate anxiety (10 ≤ GAD-7 ≤ 14)	NA		43	(12.8)	8	(4.5)
Severe anxiety (GAD-7 ≥ 15)	NA		17	(5.1)	3	(1.7)
Behavioral and emotional problems						
Youth (YSR) and parents (CBCL)						
Nonclinical (YSR/CBCL ≤ 64)	283	(82.2)	323	(96.4)	174	(98.8)
Borderline (65 ≤ YSR/CBCL ≤ 69)	41	(11.8)	8	(2.4)	1	(0.6)
Clinical (YSR/CBCL ≥ 70)	21	(6.0)	4	(1.2)	1	(0.6)
Sleep quality						
Youth (PSQI)						
Good sleep quality (PSQI ≤ 5)	144	(41.9)	NA		NA	
Poor sleep quality (5 < PSQI ≤ 10)	175	(50.9)	NA		NA	
Sleep disorder (PSQI > 10)	25	(7.3)	NA		NA	
Perceived discrimination						
Youth (PRaCY)						
No discrimination	41	(11.9)	NA		NA	
At least 1 experience of discrimination ever	303	(88.1)	NA		NA	
Parents (EDS)						
No discrimination	NA		157	(46.9)	88	(50.0)
At least 1 experience of discrimination a few times a year	NA		178	(53.1)	88	(50.0)
Vicarious racism stress						
Youth and parents (VERS)						
No experience with racism	110	(32.0)	99	(29.6)	54	(30.7)
At least 1 experience of racism a few times a year	234	(68.0)	236	(70.4)	122	(69.3)

Note: CBCL = Child Behavior Checklist (T scores); CDI-2 = Child Depression Inventory-2 Short Form (T scores); EDS = Everyday Discrimination Scale; GAD = generalized anxiety disorder; GAD-7 = Generalized Anxiety Disorder-7; NA, not applicable; PHQ-9 = Patient Health Questionnaire-9; PRaCY = Perceptions of Racism in Children and Youth; PSQI = Pittsburgh Sleep Quality Index (global scores); SCARED-GAD = Screen for Child Anxiety Related Emotional Disorders-Generalized Anxiety Disorder Subscale; VERS = Vicarious Experiences of Racism Scale; YSR = Child Behavior Checklist Youth Self-Report (T scores).

^aThe baseline interview was not completed by 9 mothers.

^bThe baseline interview was not completed by 168 fathers.

TABLE 3 Pearson Correlation Coefficients of Youth-Reported Measures in Wave 1 Survey

Wave 1 variable (youth-reported)	1	2	3	4	5	6	7	8	9
Discrimination-related stressors									
1. Perceived racial discrimination (PRaCY)	—	—	—	—	—	—	—	—	—
Potential mechanisms									
2. Perceived social position (McArthur Social Position Ladder)	−0.08 [.13]	—	—	—	—	—	—	—	—
3. Cognitive reappraisal (ERQ)	0.10 [.07]	0.05 [.40]	—	—	—	—	—	—	—
4. Expressive suppression (ERQ)	0.14 [.010]*	0.00 [.94]	0.17 [.002]*	—	—	—	—	—	—
5. Anger (STAXI-2 C/A Anger Expression-Out)	0.21 [<.001]*	−0.09 [.09]	−0.10 [.08]	0.04 [.44]	—	—	—	—	—
6. Racism-related vigilance (HVS)	0.39 [<.001]*	−0.11 [.04]*	0.25 [<.001]*	0.26 [<.001]*	0.15 [.005]*	—	—	—	—
Mental health and sleep outcomes									
7. Depressive symptoms (CDI-2)	0.36 [<.001]*	−0.20 [<.001]*	−0.02 [.72]	0.34 [<.001]*	0.35 [<.001]*	0.33 [<.001]*	—	—	—
8. Anxiety symptoms (SCARED-GAD)	0.30 [<.001]*	−0.19 [<.001]*	0.15 [.005]*	0.24 [<.001]*	0.25 [<.001]*	0.45 [<.001]*	0.54 [<.001]*	—	—
9. Sleep quality and disturbances (PSQI)	0.31 [<.001]*	−0.20 [<.001]*	−0.01 [.82]	0.21 [<.001]*	0.28 [<.001]*	0.23 [<.001]*	0.53 [<.001]*	0.38 [<.001]*	—

Note: Brackets contain *p* values. CDI-2 = Child Depression Inventory-2 Short Form; ERQ = Emotion Regulation Questionnaire; HVS = Heightened Vigilance Scale; PRaCY = Perceptions of Racism in Children and Youth; PSQI = Pittsburgh Sleep Quality Index; SCARED-GAD = Screen for Child Anxiety Related Emotional Disorders–Generalized Anxiety Disorder Subscale; STAXI-2 C/A = State-Trait Anger Expression Inventory-2 for Children and Adolescents.

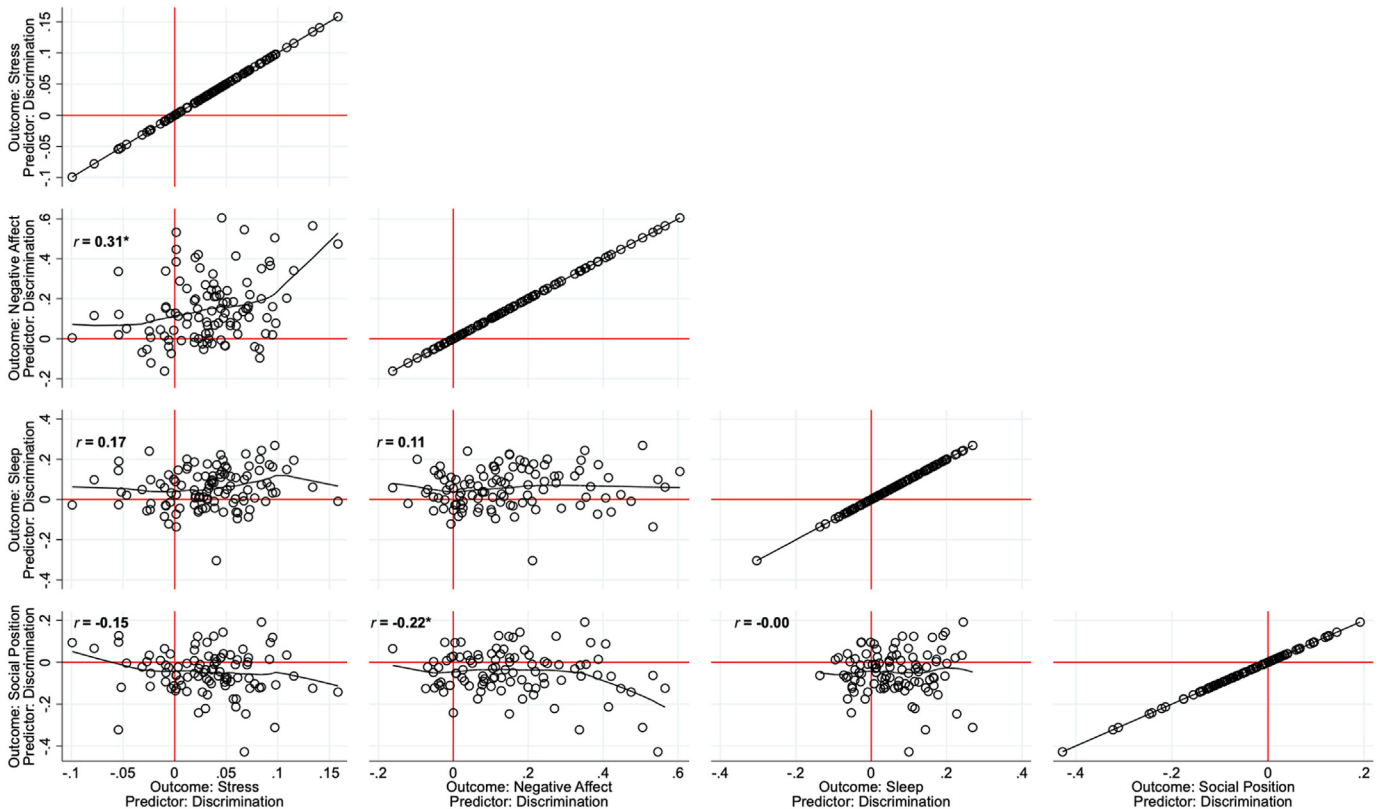
**p* < .05.

TABLE 4 Pearson Correlation Coefficients of Youth-Reported Measures in the Daily Diary Data

21-Day daily diary variable	1	2	3	4	5	6	7	8	9
Discrimination-related stressors									
1. Perceived racial discrimination (REDI)	—	−0.03 [.23]	0.04 [.18]	−0.01 [.85]	0.14 [<.001]*	0.13 [<.001]*	0.14 [<.001]*	0.03 [.20]	0.07 [.01]*
Potential mechanisms									
2. Perceived social position (McArthur Social Position Ladder)	−0.07 [0.21]	—	−0.01 [.76]	−0.05 [.009]*	−0.13 [<.001]*	−0.03 [.23]	−0.05 [.02]*	−0.10 [<.001]*	−0.03 [.13]
3. Cognitive reappraisal (ERQ)	0.11 [.06]	0.00 [.98]	—	0.13 [<.001]*	−0.08 [<.001]*	0.03 [.14]	−0.02 [.23]	−0.02 [.25]	0.01 [.48]
4. Expressive suppression (ERQ)	0.05 [.42]	−0.14 [.01]*	0.33 [<.001]*	—	0.02 [.35]	0.06 [.008]*	−0.02 [.29]	0.08 [<.001]*	0.04 [.02]*
5. Anger (NIH-A)	0.31 [<.001]*	−0.17 [.003]*	−0.03 [.57]	0.13 [.02]*	—	0.15 [<.001]*	0.25 [<.001]*	0.18 [<.001]*	0.09 [<.001]*
6. Racism-related vigilance (HVS)	0.38 [<.001]*	−0.03 [.55]	0.09 [.12]	0.19 [<.001]*	0.33 [<.001]*	—	0.17 [<.001]*	−0.02 [.40]	0.06 [.001]*
Mental health and sleep outcomes									
7. Negative affect (PANAS)	0.29 [<.001]*	−0.10 [.08]	0.10 [.07]	0.17 [.003]*	0.64 [<.001]*	0.44 [<.001]*	—	0.11 [<.001]*	0.08 [<.001]*
8. Stress (PSS)	0.16 [.005]*	−0.23 [<.001]*	−0.17 [.002]*	0.37 [<.001]*	0.39 [<.001]*	0.16 [.005]*	0.32 [<.001]*	—	0.08 [<.001]*
9. Sleep quality and disturbances (PSQI)	0.23 [<.001]*	−0.20 [<.001]*	−0.07 [.21]	0.16 [.004]*	0.41 [<.001]*	0.22 [<.001]*	0.36 [<.001]*	0.38 [<.001]*	—

Note: Brackets contain p values. Between-youth correlation coefficients are presented in the lower triangle; within-youth correlation coefficients (in boldface type) are presented in the upper triangle. ERQ = Emotion Regulation Questionnaire; HVS = Heightened Vigilance Scale; NIH-A = NIH Toolbox–Anger; PANAS = Positive and Negative Affect for Children; PSQI = Pittsburgh Sleep Quality Index; PSS = Perceived Stress Scales; REDI = Racial Ethnic Discrimination Index.

*p < .05.

FIGURE 1 Bivariate Plots of Within-Youth Standardized Random Slope Estimates for the Effect of Discrimination on Stress, Negative Affect, Sleep, and Social Position

Note: r = Pearson correlation coefficient. Please note color figures are available online.

* $p < .05$.

suppression. As in the wave 1 results, racial discrimination was not significantly associated with higher perceived social position in the diary. Further, expressive suppression, anger, racism-related vigilance, negative affect, stress, and poor sleep quality all were positively correlated with each other. In the daily diary, the strongest between-youth correlations were observed between anger and negative affect ($r = 0.64$, $p < .001$), even after taking out the anger item in the PANAS-SF. Also consistent with wave 1 correlations, higher perceived social position was negatively correlated with stress and poorer sleep quality in the daily diary.

In the upper triangle of Table 4, we present summaries of the within-youth correlations from the daily diary. Although the within-youth and between-youth correlations are mathematically and conceptually distinct, they were consistent in direction. On days when youth reported higher discrimination, they also reported more anger, racism-related vigilance, and negative affect ($r = 0.14$, $p < .001$; $r = 0.13$, $p < .001$; $r = 0.14$, $p < .001$). At the within-youth level, anger, racism-related vigilance, negative affect, stress, and sleep quality also all were positively

correlated (except for racism-related vigilance with stress). Higher perceived social position was negatively correlated with expressive suppression, anger, negative affect, and stress. Despite the similarity of the pattern of associations, the within-youth correlations were consistently smaller in magnitude than the between-youth correlations.

The within-youth correlations represent weighted averages of youth-specific correlations, so it is important to consider variation across youth. We examined the key associations between daily perceived racial discrimination, 3 outcomes (stress, negative affect, sleep), and one potential mechanism (perceived social position). We regressed these 4 variables on perceived discrimination using multilevel models representing discrimination as a within-youth standardized predictor (daily reports centered around youth-specific mean and divided by the youth-specific SD). The details of the fixed effects estimates are presented in Tables S12, S13, and S14 and Figures S1 and S2, available online. We focus here on estimates of individual differences in the slopes, which combine the empirical Bayes estimates of the random effects with the fixed-effect means and can be

interpreted as estimates of individual reactivity to perceived discrimination over the 21 diary days for each outcome.

Figure 1 shows the spread of estimates by outcome on the diagonal of a matrix of plots. For all outcomes, there is evidence of considerable variation in reactivity to discrimination. The first panel of this diagonal represents the effect of discrimination on stress (standardized slope) for each youth.⁵³ Most youth reported increased stress on days when they reported more discrimination (upper-right quadrant). However, some youth seemed to report less stress on days when they reported more discrimination (lower-left quadrant). Further, there was striking variability in the effect of discrimination on stress across youth.

Figure 1 also shows bivariate scatterplots of the estimated individual slopes for each of the 4 outcomes. These show the extent to which youth responses to discrimination are similar in terms of stress, negative affect, sleep quality, and perceived social position. The reactivity in terms of stress and negative affect were most similar ($r = 0.31$, $p = .001$), but reactivity in terms of sleep was uncorrelated with stress ($r = 0.17$, $p = .07$) and negative affect ($r = 0.11$, $p = .24$). Reactivity in terms of perceived social position was uncorrelated with stress ($r = -0.15$, $p = .15$) and sleep quality ($r = -0.00$, $p = .98$), but negatively correlated with negative affect ($r = -0.21$, $p = .04$). These results illustrate the diversity of individual responses, both adaptive and maladaptive, to perceived discrimination stressors.

DISCUSSION

Few studies implement a multilevel conceptual framework with a triadic longitudinal design, combining process-oriented methods (ie, daily diaries) and yearly mental health and sleep assessments with Latinx families. The ongoing longitudinal *Seguimos Avanzando* project intends to test predictions from 2 theoretical models regarding the dynamics of reactions to discrimination-related stressors during adolescence. Over 3 years, we will measure psychological and sleep-related responses to discrimination, racism-related vigilance, anger, depression, and other negative feelings. We also assess cognitive, affective, and family-based resilience to negative interactions in schools and neighborhoods that can help youth cope with distress. In this article, we report evidence that we could recruit and assess an understudied sample of Latinx youth and their parents and measure key constructs reliably. We also present initial findings from the first wave of the 3-wave survey and 21-day daily diary study.

Reliability of Measures

Adapting measures of discrimination, daily stress, psychological states, and daily sleep patterns to a study of youth in

immigrant families appears to be successful. Most youth measures showed an internal consistency of 0.80 or more except for the Car, Relax, Alone, Forget, Friends, Trouble questionnaire (CRAFFT) ($\omega = 0.61$), Expressive Suppression ($\omega = 0.64$) of the Emotion Regulation Questionnaire, and the Grit Scale ($\omega = 0.58$). We are not the first to find reliability problems with the 6-item CRAFFT Questionnaire.⁵⁶ We investigated some potential sources of low reliability. We found that removing the first item of the CRAFFT would result in a ω of 0.84, likely because youth who reported no substance use may have found the instructions confusing. Similarly, some terminology from the Grit and Expressive Suppression scales appeared to be unclear to younger youth. Low internal consistency of fathers and mothers for the Major Experiences of Discrimination Scale (MEDS) might be linked to endorsing only some experiences of discrimination. Using an ethnically homogeneous sample and identifying linguistically and culturally appropriate measures are essential to capturing the nuanced lives of Latinx families.

Sociodemographic, Mental Health, and Sleep Measures

We found participation of mothers higher than that of fathers at wave 1, consistent with previous literature.⁵⁷ In our sample, 80.5% of youth reported having a 2-parent family structure, congruent with a previous study (where 88.5% of youth reported a 2-parent family structure) in the same region,⁵⁸ but higher than data from the 2019 American Community Survey showing that 56% of Latinx children live with 2 parents.⁵⁹

Youth scores in the Child Depression Inventory-Short Form were higher than in Mexican youth living in Indiana in a previous study⁵⁸ and slightly lower compared with a larger sample of first-generation Latinx adolescents in the United States.⁶⁰ Nearly one-third of youth in our study reported elevated depressive symptoms compared with a survey in which only 7% were symptomatic for depression.⁶⁰ Both the COVID-19 pandemic and the deteriorating immigration policy conditions⁶¹ may explain the higher levels of depression in our sample compared with those in a similar pilot study.⁵⁸ Economic instability, through restricted benefits to immigrants and rhetoric about economic drain and cultural threat,⁶² creates a negative social mirror for youth.

We found that 44.5% of youth reported probable GAD, with a mean score of 8.4 on SCARED-GAD. Cardoso *et al.*⁶³ also found that 44.7% of Latinx high school students exhibited clinical levels of GAD, with a reported mean of 8.8 in the GAD subscale of SCARED. This suggests the importance of intervening to address anxiety and depression. Approximately 17.8% of Mexican youth in our

sample also endorsed emotional and behavioral problems (YSR), consistent with a Mexican youth sample.⁶⁴ Contributing factors for Mexican American youth could be acculturative stress, associated with worse mental health outcomes,^{65,66} the COVID-19 pandemic, exposure to food insecurity, and housing instability.⁶⁷ Discrimination and uneasiness in social situations responding to racism could also cause elevated risk.²

We identified discrepancies in reporting mental health needs between parents and youth, consistent with studies of parental underreporting compared with youth self-reports.⁶⁸⁻⁷⁰ Latinx parents may underestimate youth mental health problems, as do many parents of children experiencing internalizing behaviors. Foreign-born parents may be unaware of acculturative stress in schools and neighborhoods,⁷¹ may want to anchor their children in Mexican values,⁷² and may underestimate the struggles of their in adapting to US norms.

Most youth (57.7%) have been found to have poor sleep quality as measured by global PSQI scores of 6 or greater,⁷³ similar to what we found here, where 58.2% had poor sleep quality. As sleep is essential for restoration and overall good health, attention to sleep disturbances is imperative.⁷⁴

Perceptions of experiences of racism among Mexican American youth were high, similar to studies with other racial and ethnic minorities.⁴⁵ Vicarious racism was high across youth and parent reports for ever discrimination. The Immigration Policy Climate index of 2009-2019 shows Indiana as one of the top 3 states for exclusionary immigrant environment.⁷⁵

Empirical Findings Examining Cross-Sectional and Daily Associations Between Discrimination-Related Stressors, Hypothesized Potential Sociopsychological Mechanisms, and Youth Mental Health and Sleep Outcomes

Tables 3 and 4 illustrate that the retrospective survey and daily diary reports produce coherent findings, one representing a summary of recalled discrimination and reactions and the other representing day-to-day discrimination exposure. Findings are consonant with our theoretical frameworks, where discrimination is associated with several proposed mechanisms that can adversely impact mental health and sleep outcomes. Although discrimination seems to be consistently associated with adverse outcomes, Figure 1 demonstrates substantial heterogeneity across youth, suggesting that discrimination might be less connected to negative affect for some. We will examine explanations when all 3 surveys reveal the developmental course of exposure and reactions. For example, a warm family environment, particularly in

moments of distress or rejection, might buffer the effects of discrimination and racism. Other research indicates that differences in youth racial and ethnic identity,^{76,77} self-esteem,⁷⁸ peer victimization,⁷⁹ and social acceptance⁸⁰ might be associated with the observed heterogeneity. Figure 1 also implies that the processes that connect discrimination and negative affect or stress might be similar, but not the process relating discrimination to sleep. The relation between sleep and discrimination has been observed after adjusting for depression.⁸¹ If youth exposed to discrimination do not experience depression, it might lead to self-agency, with less of a negative outcome. Similarly, school belonging can mediate the association between discrimination and sleep quality.⁸² Most importantly, the results in Figure 1 raise questions about which responses to daily discrimination lead to better adaptation over the 3 years of the project and which signal adverse dynamic processes that could be targeted for intervention.

Social position does not seem to relate to discrimination but is associated with negative outcomes. Youth social position might be more related to opportunities for social interaction and support in the school environment that gives youth perceived school status.⁸³

Our study has certain limitations. Our findings from the first wave of the ongoing longitudinal *Seguimos Avanzando* study did not allow for causal inference analysis. Developmental changes will be studied with the 3 waves of data. We did not have a non-Mexican group with which to contrast our findings. Despite staff assurance of confidentiality, anecdotally, parents reported concerns about immigration agencies, which might have limited disclosure of mental health problems (parents) and substance use (youth). Another limitation is that the current study relies entirely on self-reported measures, including instruments adapted to collect daily data, such as the PSQI. The complexity of managing extensive data on fathers, mothers, and youth and a limited budget made it unfeasible to complement the study with additional objective measures.

Addressing mental health of Mexican-origin youth might require a multilevel approach. Our findings suggest the importance of creating awareness of youth mental health symptoms in families in Latinx communities,⁸⁴ addressing poor sleep and depression and anxiety symptoms. Because there might be different processes for how discrimination-related stressors impact negative affect and stress vs sleep, our results over the next waves will better identify these different targets. However, structurally based interventions to enhance mental health of Mexican youth may also need to consider the heterogeneity in reaction of youth to these stressors and the individual coping and family resources that might lead to differential outcomes, as well as address sleep

and social position, that could be linked to systemic marginalization, poverty, and community disinvestment.⁸⁵

This article is part of a special series devoted to addressing bias, bigotry, racism, and mental health disparities through research, practice, and policy. The 2023 Antiracism Team includes Deputy Editor Lisa R. Fortuna, MD, MPH, MDiv, Consulting Editor Andres J. Pumariega, MD, PhD, Diversity, Equity, and Inclusion Emerging Leaders Fellows Tara Thompson-Felix, MD, and Amalia Londoño Tobón, MD, Assistant Editor Eraka Bath, MD, Deputy Editor Wanjikū F.M. Njoroge, Associate Editor Robert R. Althoff, MD, PhD, and Editor-in-Chief Douglas K. Novins, MD.

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