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## Racial Discrimination and Depressive Symptoms among Latina/o College Students: The Role of Racism-Related Vigilance and Sleep

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### Abstract

**Introduction:** Latinx college students are at high risk of suffering from depressive symptoms. A factor posited to influence depressive symptoms among Latinx college students is racial/ethnic discrimination. However, the *mechanisms* which link racial/ethnic discrimination to depressive symptoms are not well understood. This study examined the mediating role of racism-related vigilance and sleep-related factors (i.e., sleep quality, sleep efficiency) on the relationship between perceived intergroup racial/ethnic discrimination and depressive symptoms.

**Methods:** Participants were 194 Latinx college students enrolled at a Midwestern university designated as a Hispanic-Serving Institution. Path analysis was conducted to investigate whether racism-related vigilance and sleep-related factors (i.e. sleep quality, sleep efficiency) are potential pathways in the relationship between intergroup racial/ethnic discrimination and depressive symptoms.

**Results:** Path analysis revealed that racism-related vigilance and sleep quality sequentially mediated the effect of perceived intergroup racial/ethnic discrimination on depressive symptoms. Sleep efficiency did not mediate the relationship between racial/ethnic discrimination and depressive symptoms.

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Catherine Pichardo was the lead author and made the largest contributions to the conceptualization, data curation, and formal analysis of the study. Ms Pichardo lead the writing, reviewing, and editing of the manuscript.

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**Discussion:** This study is among the first to document that intergroup racial/ethnic discrimination is negatively related to mental health through both cognitive and behavioral mechanisms. This research has important implications for understanding how discrimination may influence mental health outcomes among Latinx college students.

### Keywords

Latina/os; Racial/Ethnic Discrimination; Racism-related Vigilance; Sleep Quality; Sleep Efficiency; Depressive Symptoms

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In the last decade, Latinxs have accounted for approximately half of the U.S. population growth, with approximately 59.9 million Latinxs currently residing in the US (Flores, Hugo Lopez, and Krogstad 2019). Concurrently, the Latinx college/university population has risen exponentially, from 8.0 percent in 1996 to 19.1 percent in 2016 (Bauman 2017). Moreover, nearly 20% of Latinx college students in the U.S. report having depression (Lipson, Kern, Eisenberg, and Breland-Noble 2018). These data are concerning, given that mental health problems among people of color are shown to be more severe, chronic, and disabling compared to Whites (Williams, González, Neighbors, Nesse, Abelson, Sweetman et al. 2007). Further, mental health in early adulthood has implications for academic functioning, degree completion, and economic productivity (Bloom, Cafiero, Jané-Llopis, Abrahams-Gessel, Bloom, Fathima et al. 2012; Fergusson, Boden, and Horwood 2007). As the fastest growing segment of the college population, the potential costs of Latinx college students' would-be contributions to society are substantial, including a major impact on our nation's health and economic growth. Thus, it is imperative to examine factors that may contribute to mental health among this critical segment of the population.

While several factors contribute to poor mental health among Latinxs, mounting evidence suggests that racial/ethnic discrimination—defined as differential treatment of members of these groups (people of color) by both individuals and social institutions (Williams and Mohammed 2009)—plays a significant role. Among students, studies find that Latinxs experience racial/ethnic discrimination (hereafter referred to as racial discrimination) (Basañez, Warren, Crano, and Unger 2014; Castillo 2009), which places them at increased risk of poor mental health (Arbona and Jimenez 2014; Corona, Rodríguez, McDonald, Velazquez, Rodríguez, and Fuentes 2017). Indeed, the evidence linking experiences of racial discrimination to mental health (e.g., depression/depressive symptoms) is extensive and robust (Araújo and Borrell 2006; Lee and Ahn 2012). However, much of this literature has focused on direct associations, with few studies investigating potential mechanisms by which racial discrimination may impact the mental health in people of color, and Latinx college students more specifically. Thus, the purpose of this study is to examine cognitive and behavioral mechanisms (race-related vigilance and sleep disturbances, defined below) through which racial discrimination may relate to depressive symptoms among Latinx college students. Investigating processes by which discrimination may come to affect Latinx students' mental health may help us target specific areas to address as part of tailored interventions focused on reducing depression in this population.

## Discrimination and Mental Health: The Role of Racism-Related Vigilance and Sleep

Racial discrimination has been conceptualized in several ways, although it is predominantly understood to be a race-related psychosocial stressor (Brondolo, Blair, and Kaur 2017; Clark, Anderson, Clark, and Williams 1999). Of particular relevance to our study, we draw from Brondolo and colleague's (2017) social-cognitive framework of racism, which focuses particularly on the role of social-cognitive processes in the relationship between racial discrimination and depression. This framework posits that experiences of racial discrimination may evoke changes in schemas, cognitions, and appraisals of threat that, when prolonged, can result in increased risk for depression. For example, being discriminated against may prompt individuals to scan their environment routinely and prepare for the possibility of harm (Brondolo et al. 2017). Moreover, discriminatory experiences may elicit negative relational schemas (e.g., mistrust of others) that can create interferences in interpersonal relationships, and which may result in negative emotional states (e.g., feelings of sadness and loneliness; Brondolo et al. 2017). Prior experiences with discrimination may also engender perseverative, past-oriented (e.g., rumination) and future-oriented cognitions (e.g., worry/preoccupation) (Watkins, Moulds, and Mackintosh 2005). Previous studies find that discrimination is associated with nightly worry among African Americans (Beatty, Hall, Kamarck, Buysse, Owens, Reis et al. 2011) and with worry/preoccupation and rumination among Latinxs (Borders and Liang 2011; Miranda, Polanco-Roman, Tsypes, and Valderrama 2013). Moreover, other studies find that increased reports of rumination partially explain the association between racial discrimination and worse sleep quality (Hoggard and Hill 2018), a robust correlate of depression (Goldstein and Walker 2014; Scott, McNaughton, and Polman 2006). In fact, a comprehensive review of the literature found strong support for the positive association between sleep disturbances and depression (Tsuno, Besset, and Ritchie 2005). Important to note is that these social-cognitive processes may be sustained even when the threat is no longer there, which can result in race-related vigilance (Brondolo et al. 2017).

Racism-related vigilance, which refers to *cognitive* (e.g., “think in advance about the kinds of problems you are likely to experience”) and *behavioral efforts* (e.g., “carefully watch what you say and how you say it”; “carefully observe what happens around you”) oriented toward monitoring, responding to, and attempting to protect oneself from threats of being discriminated against (cf. Williams 2018), generally resulting from prior experiences with discrimination (whether personally or vicariously experienced). Race-related vigilance is an often-invoked, but rarely tested discrimination-related response, despite that research shows people of color who experience racial discrimination are more likely to report being more vigilant than those who do not report racial discrimination (Mays, Cochran, and Barnes 2007; Sawyer, Major, Casad, Townsend, and Mendes 2012). Indeed, for people of color, prior experiences with discrimination may prompt individuals to think through and take proactive steps toward preventing the likelihood of future occurrences or coping with the possibility of being targets of discrimination (Clark, Benkert, and Flack 2006; LaVeist, Thorpe, Pierre, Mance, and Williams 2014; Himmelstein, Young, Sanchez, and Jackson 2015). For example, in a qualitative study racism-related experiences of African American

women, one respondent noted the following: “When I’m going shopping, I prepare myself...it’s like I will take forever to find me something to wear because I feel I’m not going to be treated right...and I feel I shouldn’t have to do that, but I do that because I’m treated different. I think when I go out everyday some situation is going to happen as far as racism” (Nuru-Jeter, Dominguez, Hammond, Leu, Skaff, Egerter et al. 2009, p. 35).” These qualitative data are supported by a quantitative study that found experiences of discrimination were associated with increased levels of racism-related vigilance among African American adults (Himmelstein et al. 2015). Together, these studies suggest that people of color may “shield” or “ready themselves” to cope with potential discrimination through the adoption of race-related survival strategies such as race-related vigilance (Hicken, Lee, Ailshire, Burgard, and Williams 2013). While race-related vigilance may serve a protective function in the short-term, when used constantly, may come to negatively impact one’s mental health (Hicken et al. 2013; Himmelstein et al. 2015)

Further, given that racial discrimination is primarily conceptualized and found to be a pervasive and chronic psychosocial stressor in the lives of people of color, we also draw from Clark et al.’s (1999) biopsychosocial model of racism, which postulates that chronic exposure to race-related stress can trigger a host of physiological and psychological responses, as well as engagement in discrimination-related coping strategies. For example, at the physiological and psychological levels, experiences of discrimination they may lead to physiological dysregulation (e.g., hyperarousal during sleep, high nocturnal blood pressure) (Brosschot, Gerin, and Thayer 2006; Hall, Buysse, Nowell, Nofzinger, Houck, Reynolds et al. 2000; Kahn, Sheppes, and Sadeh 2013; Mohr, Vedantham, Neylan, Metzler, Best, and Marmar 2003; Williams and Mohammad 2009) and psychological disruptions (e.g., emotional regulation/negative affect). These stress-induced responses can result in sleep disturbances (Hicken et al. 2013; Slopen and Williams, 2014), which may result in increased risk for depression, independent of coping strategies employed to deal with the stressor (Clark et al. 1999). Moreover, prior experiences with discrimination may result in engaging in coping strategies such as race-related vigilance, which can lead to acute stress responses that may increase risk of depression (Himmelstein et al. 2005). For example, Himmelstein et al. (2015) found that discrimination was associated with depression via vigilance and stress, while another study found that vigilance was associated with higher levels of depressive symptoms and contributed to the black-white disparity in depression (LaVeist et al. 2014). Qualitative research with African American women provides some support for these varied discrimination-related stress responses:

*“...it’s like you get tense. Because you know...I know this person is going to say something that’s going to make me, my heart rate [go up], or maybe have to hold back my tears while I’m talking to them. I don’t want them seeing me crying, cause I don’t want them thinking I’m sad, I’m not sad, I’m mad... you just get tense, cause you know you have to brace yourself for something stupid that they’re gonna say...with a White person, you know that some level of racism is going to hop out of their mouth...And so you have to prepare your body for that”* (Nuru-Jeter et al., 2009, p. 35).

Indeed, as the above quote illustrates, the uncontrollable nature of racial discrimination may provoke negative emotions such as anger or sadness, produce physiological changes such as an increased heart rate, and lead one to routinely engage in monitoring and/or modifying behavior in order to protect oneself from the potential threat of anticipated discrimination (Hicken et al. 2013). As argued by both Brondolo and colleagues (2017) and Clark et al.'s (1999) conceptual frameworks, these discrimination-related responses may alleviate stress in the short term. In the long term, however, they may result in increased risk of poor mental health problems, including depressive symptoms and depression.

Taken together, theoretical and empirical research cited above suggests that racial discrimination may be implicated in the development of depressive symptoms through the activation of racism-related vigilance, and in turn, sleep disturbances. In the present study, we tested a model with two micromediation chains (see Figure 1) that examined the indirect effects of intergroup racial discrimination on depressive symptoms via racism-related vigilance and two sleep dimensions (i.e., sleep quality and efficiency). We hypothesized that intergroup racial discrimination would be indirectly associated with greater levels of depressive symptoms via increased racism-related vigilance, and, in turn, poor sleep (sleep quality and efficiency) in a sequence.

## Methods

### Participants

Participants were 194 self-identified Latinx undergraduate students age 18 years or older ( $M = 20.44$ ;  $SD = 2.54$ ; range = 18 – 34) who were enrolled at an urban, Midwestern university at the time of recruitment (2016–2017). The sample consisted of 59.28% self-identified female students. Participants' year in school was: first year (31.44%), second year (11.86%), third year (19.59%), fourth year (25.26%) and 5th year and beyond (2.58%). Approximately three-fourths (72.68%) of participants were born in the United States and 70.62% identified as being of Mexican heritage. Table 1 summarizes characteristics of the sample.

### Procedures

Data for the present study is a convenience sample that is part of a larger study conducted from 2016 to 2017 that focused on social experiences, coping strategies, and health of Latinx undergraduate students at a Midwestern University designated as a 4-year public Hispanic Serving Institution (HSI). The majority (54%) of HSIs are 4-year institutions (Excelencia in Education, 2020) and are geographically concentrated in urban areas, with 83% located in six states and one territory (Hispanic Association of Colleges and Universities, 2019). The geographic area of the HSI from which our sample was drawn is part of one of these six states and is located in a major city with the fifth largest Latinx population in the U.S. and the state with the fifth highest number (i.e., 25 institutions) of HSIs (Hispanic Association of Colleges and Universities, 2019).

Participants were recruited via mass email, flyers and in-class announcements. Prospective participants were instructed to contact research personnel via email if they were interested in participating in the study and met the following eligibility criteria: (1) self-identified as

Latina/o or Hispanic; (2) enrolled as an undergraduate at the time of study; and (3) were at least 18 years of age. An email with a Qualtrics online survey link was provided to students who contacted the research personnel confirming they met the criteria for participation. Participants completed the survey at their own time. All participants provided their consent prior to completing the Qualtrics survey. Once participants completed the survey, they received a code, which they emailed to study researchers to receive their incentive for participation (i.e., \$20 Amazon gift card). The Institutional Review Board of the university in which the study was conducted approved all study procedures.

## Measures

**Demographics.**—All participants answered questions about sociodemographic characteristics such as age (in years), gender (male, female), nativity status (U.S.-born, or foreign-born), class year, Latinx ethnicity, and annual household income.

**Main Measures.**—For all of the following variables (below), which were included in main path analysis models, we calculated the mean for those who had at least 80% of the items present from their respective scales. These are considered sum scores, since we created the mean and then multiplied by the total of items for each respective measure; thus, instead of simply summing the items, this approach allows for calculation of a sum with some missing data present. Item-level missingness for all key measures ranged from 0% to 9.28%. This approach performs equally when compared to other approaches (e.g., available item-analysis, imputation) when dealing with low item-level missingness (< 10%) (Parent 2013).

**Racial/Ethnic Intergroup Discrimination.**—Racial/ethnic intergroup discrimination was measured using a modified version of the Daily Life Experiences (DLE) scale. The original DLE is part of the Racism and Life Experiences Scales (RALES), which was validated with a diverse sample of adults that also included Latinx adults (Harrell 1994, 1997, unpublished manuscript). The DLE consists of 24 questions that assess the frequency of discrimination experiences on a 6-point Likert scale ranging from 0 (*never*) to 5 (*once a week*). The DLE has demonstrated high internal consistency ( $\alpha = .89-.94$ ) among a diverse sample of college students (Harrell 1994, 1997, unpublished manuscript). In line with the goals of the larger study, which aimed to assess different forms of discrimination, we modified the DLE scale to focus on intergroup discrimination. Specifically, we modified the DLE to ask about the racial/ethnic background of the perpetrator. The items were modified to include: “... *by someone of a different racial*” at the end of each sentence. Further, the instructions were modified by changing the word “discrimination” to “intergroup discrimination” and by providing a definition of it, “being discriminated against by someone from a different racial or ethnic group.” Two sample revised items include: 1) “being treated rudely or disrespectfully by someone of a different race” and 2) “people of a different race reacting to you as if they were afraid or intimidated.” The adapted DLE scale showed high internal consistency reliability ( $\alpha = .96$ ) with the current sample, which is consistent with previous studies that used the DLE and yielded high internal consistency reliability ( $\alpha = .90$ ) with other Latinx samples (e.g., Mexicans, Dominicans; Ayón and Garcia 2019; Araujo Dawson 2009). Previous studies showed valid psychometric properties, including construct and criterion validity, with racially/ethnically diverse samples of college students

(Harrell, Merchant, & Young, 1997; Willis & Neblett 2018). Harrell et al. (1997) found that the DLE was related to measures of cultural mistrust, and salience of racial identity in theoretically expected ways. The DLE was positively correlated with cultural mistrust and salience of racial identity, which is expected given that individuals who have a general mistrust of Whites and those who perceive their race as important to their identities would report higher levels of racial/ethnic discrimination (Harrell et al., 1997; Scott, 2003).

**Racism-Related Vigilance.**—Racism-related vigilance for discrimination was measured with the Racism-Related Vigilance Scale (RRVS). This scale was originally developed for the 1995 Detroit Area study. This scale has been previously used with samples comprised of racial/ethnic minorities (Hicken et al. 2013; Himmelstein et al. 2015). The scale consists of six items rated on a 5-point Likert scale ranging from 1 (*very often*) to 5 (*never*). Sample items include: How often, based on your day-to day experiences (of discrimination) do you: “*Try to prepare for possible insults before leaving home?*” and “*Think in advance about the kind of problems that you are likely to experience?*” All items were reverse-coded and summed; higher values represent higher levels of racism-related vigilance. This scale has previously shown adequate internal consistency (Himmelstein et al. 2015) and been used as a unidimensional measure with African Americans (Clark et al., 2006). Given that few studies have used the RRVS with Latinxs (e.g., Hicken, Lee, Morenoff, House, and Williams 2014), we conducted the same analyses (i.e., principal component analysis with varimax rotation) as Clark and colleagues (2006). We found that our data yielded a one component structure (eigenvalue= 3.24), which accounted for 54% of the standardized variance (all loadings > .58). In the current sample, the RRVS showed high reliability ( $\alpha = .83$ ).

**Sleep Quality and Efficiency.**—The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, Kupfer 1989) is a 19-item scale used to assess multiple sleep-related domains (e.g., quality, efficiency, latency). This scale has 12 items rated on a 4-point scale ranging from 1 (*not during the past month*) to 4 (*three or more times a week*), and 3 items rated on a 4-point scale (1 = *very good* to 4 = *very bad*). Additionally, it has four open-ended questions. Sample items include: “During the past month, how would you rate your sleep quality overall?” and “During the past month, how long (in minutes) has it usually taken you to fall asleep each night?” As suggested by Cole and colleagues (2006), total scores for sleep quality and efficiency were created. The *sleep quality* construct includes a sum of the total scores of subjective sleep quality, sleep latency, daytime dysfunction, and use of sleep medication subscales (scores can range from 0–12). The *sleep efficiency* construct refers to the “percentage of total time in bed actually spent in sleep” (Shrivastava, Jung, Saadat, Sirohi, and Crewson 2014, p.2)” and is based on the sum of the total scores of habitual sleep efficiency and sleep duration subscales, which can range from 0–6. Raw scores were reverse coded such that total lower scores indicated worse sleep quality and efficiency. In a systematic review of 32 studies of sleep among college students, the PSQI was the most widely-used (n= 22; 69%) measure of sleep (Dinis and Bragança 2018). The PSQI has shown favorable psychometric properties, including internal consistency, retest-reliability, convergent, and divergent validity with other measures of sleep among U.S. college student (Becker, Jarrett, Luebbe, Garner, Burns, and Kofler, 2018; Benham, 2019; Dietch, Taylor, Sethi, Kelly, Bramoweth, and Roane, 2016; Lund, Reider, Whiting, and



Prichard, 2010; Manzar et al., 2018). The PSQI has also shown construct validity among U.S. college students and students of diverse Latino backgrounds (Gelaye et al 2014). The PSQI has also been found to associate with objective measures of sleep efficiency using daily diary methods (Grandner, Kripke, Yoon, & Youngstedt, 2006) and accurately distinguishes between healthy sleepers and patients suffering from various sleep disorders (Mollayeva, Thurairajah, Burton, Mollayeva, Shapiro, & Colantonio, 2016). Cronbach's alpha revealed an acceptable reliability for sleep quality ( $\alpha = .62$ ) and sleep efficiency ( $\alpha = .52$ ) in our sample.

**Depressive Symptoms.**—The 10-item Center for Epidemiological Studies-Depression (CES-D; Radloff 1977) scale was used to assess depressive symptoms in the past week. Sample items include, “During the past week “I felt lonely” and “I had trouble keeping my mind on what I was doing.” Responses are scored on a 4-point scale ranging from 1 (*rarely or none of the time: less than 1 day*) to 4 (*all of the time: 5–7 days*). Responses to items that were positively worded (i.e., “I felt hopeful about the future” and “I was happy”) were reverse coded. Items were summed, with higher scores indicating greater depressive symptomatology over the past week. Similar to others (Perreira, Gotman, Isasi, Arguelles, Castañeda, Daviglus et al., 2015), we also created a dichotomous variable to identify the prevalence of individuals at risk of depression, with a respondent classified as at-risk for probable depression based on a CES-D cut-off point of 10 or greater. The CESD-10 has shown strong psychometric properties (e.g., internal consistency, test-retest reliability, convergent and criterion validity, and measurement invariance) among Latinos (González, Nuñez, Merz, Brintz, Weitzman, Navas et al. 2017; Grzywacz et al 2010; Mohebbi et al., 2018). Confirmatory factor analyses of the CES-D 10 conducted with community- and population-based samples of Latinxs have shown adequate fit for a one-factor model (Gonzalez et al., 2017; Molina, Estrella, Rivera-Olmedo, Frisard, Lemon, & Rosal, 2018). Gonzalez et al. (2017) also found theoretically-consistent strong associations between the CES-D 10 and measures of depression (i.e., Patient Health Questionnaire-9), poor general mental health (i.e., Short-Form Health Survey-Mental Health Component), and anxiety (i.e., Spielberger Trait Anxiety Inventory) among Latinxs. Cronbach's alpha revealed high reliability for the CES-D ( $\alpha = .81$ ) in the current sample.

**Covariates.**—Prior research has revealed gender differences in reports of discrimination (Perez, Fortuna, Alegria 2008), depressive symptoms (Mendelson, Rehkopf, Kubzansky 2008), and sleep problems (Patel, Sotres-Alvarez, Castañeda, Dudley, Gallo, Hernandez et al. 2015). Therefore, gender (coded as 0 = Female, 1 = Male) was included as a covariate in path analysis. We also controlled for two conceptually-relevant race-related constructs (i.e., ethnic identity, self-reported skin color), given they were correlated at the bivariate level with some of the key study variables and have been found to associate with health outcomes among Latinx populations (Bozo, Revels-Macalinao, and Huynh 2018; Garcia, Sanchez, Sanchez-Youngman, Vargas and Ybarra 2015). Ethnic identity was measured using the brief, 6-item Revised Multigroup Ethnic Identity Measure (MEIM-R; Phinney 1992; Phinney and Ong 2007; .), which was developed using a diverse racial/ethnic sample (Phinney and Ong 2007). All six items were summed, with higher scores reflecting higher ethnic identity ( $\alpha = .89$ ). Respondent's self-reported skin color was assessed using the 1-item New Immigrant

Survey (NIS) Skin Color Scale (Massey and Martin 2003). The NIS Skin Color Scale is a color palette that includes 10 hands with a spectrum of skin tones corresponding to points from 1 (lightest shade) to 10 (darkest shade). Participants are asked to indicate the number of the hand that best matches their skin color. While the NIS has primarily been used by interviewers, measures of self-assessed skin tone have been used in population-based studies of Latinx adults (e.g., Decisions/impreMedia Survey; Garcia et al. 2015) and convenience samples of Latinx adolescents (Bozo et al. 2018).

### Analytic Strategy

Univariate statistics (percentages and means) were conducted on main study variables. Pearson's  $r$  correlation coefficient and point biserial correlations were used to examine bivariate associations between key study variables.

Main analyses consisted of conducting path analysis using Mplus Version 7 software (Muthén and Muthén 1998–2015). We tested a path model that included two micromediation chains, controlling for covariates. The advantage of this approach is that it allowed us to investigate the indirect effect of intergroup racial/ethnic discrimination on depressive symptoms through each mediator (i.e., racism-related vigilance, sleep quality, sleep efficiency) in a series (Taylor, MacKinnon, and Tein 2008). We were also able to isolate the indirect effect of each mediator. Total and specific indirect effects, standard errors (SE), and CIs were estimated using the multivariate delta method (MacKinnon 2008), as implemented in Mplus. The standard error estimates were used to test whether each of the indirect effects were different from zero through  $z$ -statistics (i.e.,  $z > 1.96$ ) (MacKinnon 2008). Indirect effects were deemed significant when CIs did not contain a zero. Path models were fitted using a robust maximum likelihood estimator (MLR), which deals with unmet assumptions of independence, normality and homoscedasticity. Missing data (ranging from 0% - 8.76% across all variables) were handled in Mplus using the full-information maximum likelihood (FIML) approach, which uses all data available for estimating parameters and results in unbiased estimates and standard errors. Further, we conducted Little's (1998) Missing Completely at Random (MCAR) test to make sure that missingness on the analytic model variables were not dependent on any other, reducing the potential for bias in model estimates. Little's MCAR test provided support for MCAR ( $\chi^2(41) = 55.5, p = .065$ ). Further, while there is no consensus in the literature regarding what would be the appropriate sample size for path analysis, several factors decrease the required sample size, including simple models, continuous variables, normally distributed data, high reliability scores, and no interaction terms (Kyriazos 2018), all of which are met in our study. And based on recommendations by Fritz and Mackinnon (2007) to detect a mediated effect, our sample size ( $N = 194$ ) would yield sufficient statistical power to detect medium-sized effects of any combination of  $\tau'$  of the indirect pathways.

The path model was defined as fitting underlying data adequately according to the following multiple model fit indices, given that the chi-square statistic is affected by sample size: Comparative Fit Index (CFI)  $> .06$ , the Root Mean Error of Approximation (RMSEA)  $< .06$ , and the Standardized Root Mean Square Residual (SRMR)  $< .08$  (Kline 2011). Additional

support for the point estimate of the RMSEA is demonstrated if the upper and lower bound values of the 90% CI are  $< .05$  (Hooper, Coughlan and Mullen 2008).

## Results

### Descriptive Analyses

On average, participants reported moderate levels of the following variables: intergroup racial/ethnic discrimination ( $M = 51.97$ ,  $SD = 24.10$ ; range = 24–144) and racism-related vigilance ( $M = 17.55$ ,  $SD = 5.19$ ; range = 6–30). Participants' depressive symptoms ( $M = 10.60$ ,  $SD = 5.55$ ; range = 0–26) were, on average, right at the elevated range of depressive symptoms. In fact, over half of respondents (53%) met the cut-off criteria for probable depression ( $> 10$ ). Participants reported, on average, moderate levels of sleep quality ( $M = 7.88$ ,  $SD = 2.10$ ; range = 0–12) and sleep efficiency ( $M = 4.73$ ,  $SD = 1.40$ ; range = 0–6).

### Bivariate Associations among Main Study Variables

Pearson's correlations (see Table 2) revealed that intergroup racial/ethnic discrimination was significantly related to higher levels of racism-related vigilance and depressive symptoms. Intergroup racial/ethnic discrimination was significantly associated with worse sleep quality. Correlations also showed that racism-related vigilance was associated with higher levels of depressive symptoms and worse sleep quality. Worse sleep quality was significantly related to higher depressive symptoms. Sleep quality was also significantly related to sleep efficiency. Sleep efficiency was associated with lower levels of depressive symptoms. Higher levels of ethnic identity were associated with higher reports of race-related vigilance. Self-reported skin tone was positively associated with intergroup racial/ethnic discrimination. Finally, point biserial correlations revealed that self-identifying as male was significantly associated with lower levels of depressive symptoms and a weaker ethnic identity.

### Multiple Mediator Path Model

We conducted a path model that included two micromediation chains to test whether racism-related vigilance and sleep (sleep quality and sleep efficiency) mediated the association between intergroup racial/ethnic discrimination and depressive symptoms. Fit indices showed that for the multiple mediator model, where both sleep measures were included, the model had a moderate fit to the data, ( $\chi^2(7, N = 194) = 10.20$ ; RMSEA = .05 (90% CI = [.00, .11]); CFI = 0.98; SRMR = .03). Figure 2 shows the specific path coefficients for the multiple mediator model. Standardized path coefficients of direct effects indicated that intergroup racial/ethnic discrimination was not directly associated with depressive symptoms. Rather, intergroup racial/ethnic discrimination was indirectly associated with depressive symptoms via racism-related vigilance and sleep quality (but not sleep efficiency) in a sequence. That is, intergroup racial/ethnic discrimination was positively associated with racism-related vigilance, which was negatively associated with sleep quality; in turn, sleep quality was negatively associated with depressive symptoms. As hypothesized, intergroup racial/ethnic discrimination was indirectly associated with depressive symptoms via heightened levels of racism-related vigilance and poor sleep quality in a sequence.

Tests of specific indirect effects (see Table 3) revealed that intergroup racial/ethnic discrimination was significantly associated with depressive symptoms via sleep quality, independent of racism-related vigilance, sleep efficiency, and covariates. Specifically, intergroup racial/ethnic discrimination was associated with worse sleep quality, which in turn was associated with greater levels of depressive symptoms. Racial/ethnic discrimination was not significantly associated with depressive symptoms via sleep efficiency, independent of racism-related vigilance, sleep quality, and covariates. Lastly, intergroup racial/ethnic discrimination was associated with greater levels of depressive symptoms via heightened racism-related vigilance, independent of sleep quality, sleep efficiency, and covariates. Specifically, higher levels of racial/ethnic discrimination were associated with higher levels of racism-related vigilance, which in turn, were associated with greater levels of depressive symptoms (see Table 3).

## Discussion

This study sought to describe ways in which intergroup racial discrimination may relate to depressive symptoms among a sample of Latinx college students. Specifically, the present study sought to identify potential cognitive and behavioral pathways by which discrimination may contribute to increased depressive symptoms. We hypothesized that intergroup racial discrimination would be associated with heightened levels of racism-related vigilance, which would be related to poor sleep quality, and, in turn, greater levels of depressive symptoms. Results provided partial support for our hypothesis. Intergroup racial discrimination was indirectly related to increased levels of depressive symptoms through both increased racism-related vigilance and poor sleep quality (but not sleep efficiency).

Our findings are consistent with data from a study of African Americans linking experiences of discrimination with heightened levels of racism-related vigilance (Himmelstein et al. 2015). Indeed, as suggested by the social-cognitive framework of racism (Brondolo et al. 2017), it is possible that when people of color are chronically exposed to racialized psychosocial stressors (e.g., racial stigma, racial discrimination), they may be more likely to shield themselves from the threat of discrimination by proactively preparing themselves, via cognitive (e.g., think in advance about the kinds of problems one is likely to experience) and behavioral efforts (e.g., carefully watch what one says or how one says it) reflective of race-related vigilance.

We found that racial discrimination was also associated with poorer sleep quality, which parallels previous research noting that interpersonal discrimination is related to a number of poor sleep outcomes—whether measured subjectively or objectively (Slopen, Lewis, Williams 2016). To our knowledge, our study is the first to examine the association between racial discrimination and racism-related vigilance, as well as racial discrimination and sleep among a Latinx college student population. From a methodological standpoint, significant associations between racial discrimination and sleep quality, but not for efficiency, were probably observed because sleep quality is a more comprehensive measure of sleeping difficulties/problems. Our sleep quality scale encompasses self-reported subjective sleep quality, sleep latency and daytime dysfunction, whereas sleep efficiency only assessed the self-reported actual duration of sleep and time spent in bed. It is plausible that different types

of discriminatory experiences may be related to unique sleep-related factors. For example, among Latinx adolescents, a study documented that overt forms of discrimination were related to decreased sleep quality but not quantity (Huynh and Gillen-O'Neel 2016). Further, another study found that adverse race-related experiences were associated with objective sleep efficiency among a sample composed of African American, White, and Asian American middle-aged adults (Beatty et al. 2011). In contrast, our current study's sample was predominantly composed of Mexican American college students and measured sleep via a subjective measure. It is important to note that these associations may differ by race/ethnicity and context since Latinxs, and specifically those in college students, may experience qualitatively different forms of racial marginalization and sleep patterns in comparison to community samples and other racial/ethnic groups.

Further, our results for the racism-related vigilance and sleep quality link are consistent with a previous study that employed a racially/ethnically diverse sample (i.e., African American, Latinx, White adults), which found that chronic racism-related vigilance is linked to sleep difficulties in all three racial/ethnic groups (Hicken et al. 2013). Consistent with the biopsychosocial model of racism (Clark et al. 1999), racism-related vigilance may over-activate the biological stress system, evoking physiological effects such as high nocturnal blood pressure and heightened anxiety stress-induced symptoms, which may disturb sleep (Gregory, Buysse, Willis, Rijdsijk, Maughan, Rowe et al. 2011; Hall, Buysse, Dew, Prigerson, Kupfer, Reynolds 1997; Kelly 2002; Williams and Mohammed 2009). We also found that racism-related vigilance was associated with greater levels of depression, which corroborates prior research that shows that vigilant coping strategies may influence mental health (Himmelstein et al. 2015; LaVeist et al. 2014; Williams 2018), given that past-oriented and future-oriented thought processes (e.g., rumination, worry) about racial discrimination may trigger negative emotional states (Brondolo et al. 2017). These cognitions have also been posited to influence depressive symptoms via sleep quality (Pascoe and Richman 2009). Non-significant associations between racism-related vigilance and sleep efficiency were in line with those between racial discrimination and sleep efficiency. This may be due to the fact that both constructs, though different from each other, often go hand-in-hand (Hicken et al. 2013); thus, resulting in similar non-significant results.

We also found that racial discrimination was not linked to depressive symptoms sequentially via both racism-related vigilance and sleep efficiency in a sequence. These findings were expected as discrimination was not associated with sleep efficiency. The current study's findings are congruent with a study conducted among a community sample of Latinxs that found that sleep efficiency and sleep duration were not significant mediators in the association between perceived racism and depressive symptoms (Steffen and Bowden 2006). Studies show that different forms of discrimination (e.g. overt, subtle) are related to specific sleep constructs but not others (Huynh and Gillen-O'Neel 2016; Slopen and Williams 2014).

In addition, our findings are in line with previous studies that have identified relationships between poor sleep quality/problems and depression and depressive symptoms (Franzen and Buysse 2008; Koffel and Watson 2009; Goldstein and Walker 2014; Scott et al. 2006). Indeed, poor sleep quality may result in the alteration of neurotransmitter receptors and neuroendocrine stress systems and decreased emotion regulation (Baglioni, Spiegelhalter,

Lombardo, Riemann 2010; Novati, Roman, Cetin, Hagewoud, den Boer, Luiten et al. 2008), all of which may lead to increased depressive symptoms.

As a chronic and pervasive stressor in the lives of Latinxs, it appears, from our findings, that experiences of racial discrimination may affect depression via cognitive and behavioral mechanisms such as race-related vigilance and sleep. Overall, findings are in line with biopsychosocial (Clark et al. 1999) and social-cognitive (Brondolo et al. 2017) frameworks that link racial discrimination to poor mental health in people of color. We should also note that our findings fit within race-based trauma models, as they posit that hypervigilance, physiological arousal, and sleep disturbances, may be resultant aspects of racial trauma (Carter, 2007; Williams, Metzger, Leins, and DeLapp 2018). For example, as noted by Carter (2017), racial trauma may lead people of color to be engaged in defense coping responses such as being vigilant, as preparation for potential racial affronts. However, we conceptualized racial discrimination more broadly as a race-related psychosocial stressor, consistent with biopsychosocial and the social-cognitive models, which together, provide a broader framework from which to explain how experiences of perceived racial discrimination may impinge on depressive symptoms specifically via stress-induced cognitive and behavioral mechanisms, as well as physiological and psychological ones.

### Limitations and Future Directions

A strength of this study is that it is the first to examine how inter-group racial discrimination may be associated with depressive symptoms through both cognitive and behavioral factors in a sample of Latinx college students. However, several key limitations must be considered. First, our sample included Latinx college students at a 4-year HSI located in the Midwest. Although a large majority of Latinx students (67%) attend HSIs (Excelencia in Education, 2020), our findings may not generalize to Latinx students at HSIs in other regions of the U.S. or Latinx students at non-HSIs. For example, nearly 70% of HSIs are located in areas outside the Midwest (i.e., California, Texas, New York, Puerto Rico; Excelencia in Education, 2020). Moreover, despite research on differences between Latinx students at HSIs and non-HSIs remains scarce, existing work shows that Latinx students at 4-year HSIs are more likely to be older, part-time and/or transfer students, and have parents with lower educational backgrounds (cf. Cuellar, 2015). Further, Cuellar and Johnson-Ahorlu (2016) found that Latinx students who believed racial discrimination was still a pervasive issue in the U.S. were more likely to enroll at non-HSIs compared to HSIs and suggested that students who enrolled in non-HSI institutions may be more critical of racial inequities. Although our convenience sample of a very specific group of Latinx college students limits our findings' generalizability, this limitation can be balanced against having provided important data on a population frequently underrepresented in psychological and other social science research. Further, as noted by Arbona, Fan, Olvera (2018), "often, in institutions with a relatively large representation of ethnic minority students, the administrative and educational infrastructure remain embedded in the predominant culture, and related policies and practices may lack sensitivity to diversity issues" (pp. 425–426). Future studies should aim to compare Latinx students from different educational contexts in order to better understand how differences in pre-college and background characteristics and institutional contexts may result in differences in perceptions of race-related experiences and outcomes.

Second, although the race-related vigilance scale showed similar and adequate psychometric properties as other studies (Clark et al. 2006), it is important to note that this measure was developed from ethnographic work with African Americans (Essed 1991). Perhaps this measure does not fully capture other salient aspects of vigilance that Latinxs may be more attuned to, including but not limited to, threats due to language/accent differences, assumptions of their documentation status, and fear of deportation (Hacker, Chu, Leung, Marra, Pirie, Brahimy et al. 2011; Viruell-Fuentes 2007). For example, Cohen and Chavez (2013) in an ethnographic study of Latinx immigrants, noted that participants, regardless of legal status, talked about the vigilance and care they had to engage in response to bigotry (e.g., needing to carry identification). Further, hypervigilance may include physiological responses such as increased cardiovascular activity (Williams and Mohammed 2009). Important next steps will be to conduct qualitative research (e.g., focus groups) among different segments of the Latinx population in order to better understand this construct among this group, and to complement self-report data on race-related vigilance with objective measures of physiologic reactivity. Further, we used retrospective methodology and self-report measures, which may have led to confounding by social desirability and memory bias. For example, individuals may not have recalled all instances in which they were treated unfairly and/or may have underreported discrimination in an attempt to not appear as victims. Similarly, self-reported sleep measures should be interpreted with caution, particularly with college students. First, some studies find that people tend to overestimate the amount they sleep on subjective measures when compared to objective sleep assessments (Lauderdale, Knutson, Yan, Liu, Rathouz 2008; Silva, Goodwin, Sherrill, Arnold, Bootzin, Smith et al. 2007), and others find that subjective and objective sleep measures do not correct highly (Cespedes, Hu, Redline, Rosner, Alcantara, Cai et al. 2016). Second, research with college populations show they tend to have irregular sleep patterns, poor sleep quality, and short sleep duration (>7 hours of sleep per night) (Buboltz, Brown, and Soper 2001; Tsai and Li 2004). As such, future studies should consider assessing different aspects of sleep via subjective (e.g., questionnaires, sleep logs) and objective measures (e.g., actigraphy), all of which have been used with college students (Schlarb, Friedrich, and Claßen 2017).

Moreover, although a causal pathway for the direct link between discrimination and race-related vigilance (Himmelstein et al. 2015), race-related vigilance and poor sleep (Hicken et al. 2013), which in turn is associated with depressive symptoms (Goldstein and Walker 2014; Scott et al. 2006), is supported by theoretical frameworks and empirical work, the cross-sectional design of the study does not allow for establishing bidirectional, temporal associations of variables in the model. One potential way to address such issues is by testing lagged and reciprocal associations with repeated measurements across short intervals using a daily-diary design (cf. Sin, Almeida, Crain, Kossek, Berkman, and Buxton 2017). Indeed, using this approach, Sin and colleagues (2017) found that daily stressors and sleep quality had bidirectional associations. Further, other studies find that people with depression may be more likely to have sleep difficulties, and have bidirectional associations (Alvaro, Roberts, and Harris 2013; Kahn et al. 2013). And while mental health may also influence the amount of discrimination people of color perceive and their quality of sleep, it is important to note that prior prospective studies and natural experiments provide support for our hypothesized

temporal ordering, such that discrimination predicts depression (Gee and Walsemann, 2009; Schulz, Gravelle, Williams, Israel, Mentz, and Rowe 2006) and poor sleep (Slopen, Lewis, and Williams 2016), and not the other way around.

Last, even though our sample was heterogeneous in some respects, we were unable to test for differences by ethnic group membership or nativity status, given that our sample was predominately comprised of Mexican American, U.S.-born students. Interlocking social structures and social identities position individuals differently in society and prior works show that reports of discrimination (Molina, Alegría, Mahalingam 2013), mental health (Lorenzo-Blanco and Cortina 2013), and sleep (Patel et al. 2015) vary by ethnic group, gender, or their intersections. In future research, it will be important to examine how social identities, independently and at their intersections, may shape reports of racial discrimination and moderate relations among study variables.

## Conclusion

Limitations notwithstanding, the current study first provides information regarding the mental health of Latinx college students at an HSI. More specifically, our findings showed that a large percentage (53%) of the sample met cut-off criteria for probable depression, somewhat similar to rates (41%) found in another study that used the CESD and employed a convenience sample of Latinx female college students at a 4-year urban, public university (Arbona et al. 2018). However, our findings differ from those of a recent study that employed a nationally-representative sample of college and graduate students in the U.S., which found nearly 20% of Latinx students met criteria for probable depression based on the Patient Health Questionnaire (Lipson, et al. 2018). Differences between our findings and those of Lipson et al. (2018) may be due to the type of sample, characteristics of the sample (college only vs. college/grad) and institutions, and use of different measures of depressive symptoms.

Chiefly, our study provides empirical evidence for theorized mechanisms by which racial discrimination may impact mental health. It extends the growing body of literature on interpersonal discrimination by documenting that racial/ethnic intergroup discrimination is associated with higher levels of depressive symptoms through increased levels of racism-related vigilance and poor sleep quality. This study illuminates potential mechanisms which can be targeted to address the social determinants of health and reduce racial/ethnic health disparities. Specifically, study findings point to the importance of ongoing assessment of racial/ethnic discrimination as a race-related psychosocial stressor in the lives of Latinx college students. This study further suggests the need to target racism-related vigilance and sleep quality as two potential modifiable factors through which interventions may ameliorate the adverse effects of racial discrimination among this segment of the population.

Given the projected exponential growth of Latinxs in higher education as well as their high rates of depressive symptoms (Hudson, Towey, Shinar 2008; Kearney, Draper, Barón 2005), it is paramount that preventive mental health interventions with this population consider the role of racialized stressors, along with the cognitive processes and health behaviors that people of color may use to cope with racism. As suggested by our findings, racialized stress while in college may affect the sleep quality and mental health of college students, both of



which may result in adverse consequences across multiple domains (e.g., academics, daily functioning, memory) (Abdulah and Piro 2018; Gomes, Tavares, de Azevedo 2011; Petrov, Lichstein, Baldwin 2014). At the individual level, interventions that address the detrimental consequences of discrimination and racism-related vigilance (e.g., mindfulness-based stress reduction, race-based trauma-informed mental health care) (Brown-Iannuzzi, Adair, Payne, Richman, Fredrickson 2014; Carter 2007; Comas-Dias 2016), may help to address cognitive processes associated with racism-related vigilance (e.g., worry), improve sleep quality, and, in turn, reduce depressive symptoms. On a societal level, eradicating racial discrimination will require systemic change, including supporting social policies and large-scale programs (e.g., public awareness educational initiatives) aimed at reducing social marginalization and racial/ethnic mental health disparities. Never more has it been more important to focus our energy at these efforts.

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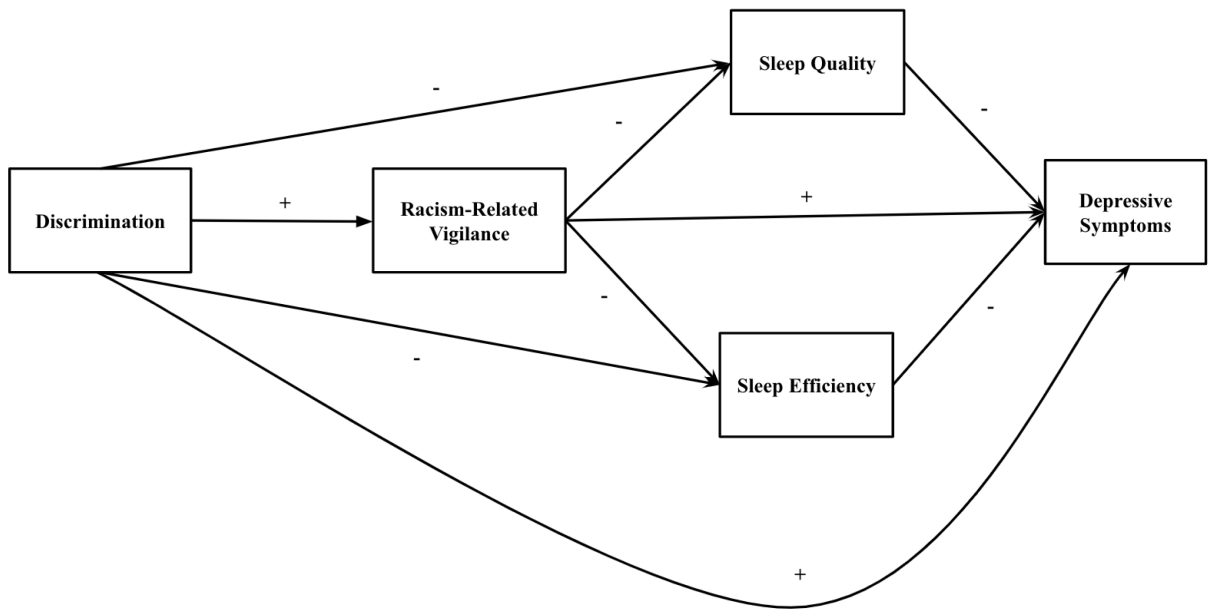
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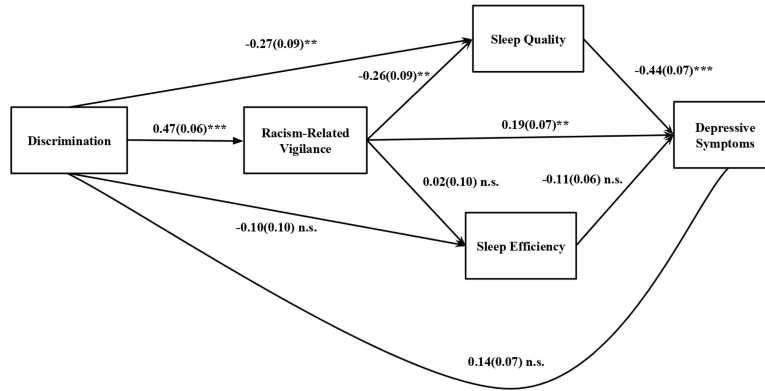
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**Fig. 1.** Hypothesized model regarding the association between intergroup racial/ethnic discrimination and depressive symptoms. Hypothesized model includes direct and indirect effects.



**Fig. 2.** Multiple mediator path model with standardized estimates and standard errors. Path model adjusted for gender. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ , n.s. = non-significant.

**Table 1**

Sociodemographic Characteristics of Analytic Sample

Participant's Characteristic	N (%) or M	SE or (SD)
Age	20.44	(2.54)
Gender		
Female	115 (59.28)	0.04
Male	62 (31.96)	0.04
Latinx Background		
Central American	7 (3.61)	0.01
Cuban Descent	6 (3.09)	0.01
Dominican	1 (0.52)	0.01
Mexican	137 (70.62)	0.03
Puerto Rican	3 (1.55)	0.01
South American	18 (9.28)	0.02
More than one heritage	3 (1.55)	0.01
Other	1 (0.52)	0.01
Class Year		
First	61 (31.44)	0.04
Second	23 (11.86)	0.03
Third	38 (19.59)	0.03
Fourth	49 (25.26)	0.03
Other	5 (2.58)	0.01
Work Status		
Employed	112 (57.73)	0.04
Not Employed	64 (32.99)	0.04
Nativity Status		
U.S.-born	141 (72.68)	0.03
Immigrant	35 (18.04)	0.03
Household Income		
< \$25,000	50 (25.77)	0.03
\$25,001 - \$50,000	64 (32.99)	0.04
\$50,001 - >\$100,000	62 (31.96)	0.04
Self-Reported Skin Color	2.88	(1.12)
Ethnic Identity	21.84	(5.26)

*Note.* Analytic Sample N= 194. Some totals may not up to 100% due to rounding or missing data.

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**Table 2**

Correlations between Study Variables

Variables	1	2	3	4	5	6	7	8
1. Depressive Symptoms	—							
2. Discrimination	.41***	—						
3. Racism-Related Vigilance	.44***	.48***	—					
4. Sleep Quality	-.61***	-.39***	-.40***	—				
5. Sleep Efficiency	-.27***	-.09	-.06	.29***	—			
6. Gender	-.20**	-.14	-.12	.10	.07	—		
7. Ethnic Identity	-.00	.11	.19*	-.14	-.11	-.20**	—	
8. Skin Color	-.13	.16*	.03	.00	.09	.20**	-.09	—

Note. Pearson’s correlations were conducted for continuous by continuous variables. Point biserial correlations were conducted for binary by continuous variables. Gender (0 [reference] = female; 1 = male).

\* p < .05;

\*\* p < .01;

\*\*\* p < .001.

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**Table 3**

Standardized path coefficients among main study variables for the total sample

	Estimate	SE	<i>p</i>	95% CI
<i>Simultaneous</i>				
Total Indirect Effect	0.27	0.05	.000	0.18, 0.36
Specific Indirect Effects				
DISC → VIG → SQ → DEP	0.05	0.02	.013	0.01, 0.10
DISC → VIG → SE → DEP	-0.001	0.01	.876	-0.01, 0.01
DISC → VIG → DEP	0.09	0.03	.007	0.02, 0.15
DISC → SQ → DEP	0.12	0.04	.005	0.04, 0.20
DISC → SE → DEP	0.01	0.01	.289	-0.01, 0.03

*Note.* N = 194. SE = standard error. CI = confidence interval. DISC = Discrimination. VIG = Racism-related vigilance. SQ = Sleep quality. SE = Sleep efficiency. DEP = Depressive symptoms. All analysis controlled for gender (0 = female [reference], 1=male), ethnic identity, and self-reported skin color.

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