HHS Public Access

Author manuscript

Cultur Divers Ethnic Minor Psychol. Author manuscript; available in PMC 2018 August 14.

Published in final edited form as:

Cultur Divers Ethnic Minor Psychol. 2017 October ; 23(4): 527–540. doi:10.1037/cdp0000146.

Ethnic/Racial Discrimination Moderates the Effect of Sleep Quality on School Engagement Across High School

Margaret Dunbar, **Sheena Mirpuri**, and **Tiffany Yip**

Fordham University

Abstract

Objective—Previous research has indicated that school engagement tends to decline across high school. At the same time, sleep problems and exposure to social stressors such as ethnic/racial discrimination increase. The current study uses a biopsychosocial perspective to examine the interactive and prospective effects of sleep and discrimination on trajectories of academic performance.

Method—Growth curve models were used to explore changes in 6 waves of academic outcomes in a sample of 310 ethnically and racially diverse adolescents (mean age = 14.47 years, *SD* = .78, and 64.1% female). Ethnic/racial discrimination was assessed at Time 1 in a single survey. Sleep quality and duration were also assessed at Time 1 with daily diary surveys. School engagement and grades were reported every 6 months for 3 years.

Results—Higher self-reported sleep quality in the ninth grade was associated with higher levels of academic engagement at the start of high school. Ethnic/racial discrimination moderated the relationship between sleep quality and engagement such that adolescents reporting low levels of discrimination reported a steeper increase in engagement over time, whereas their peers reporting poor sleep quality and high levels of discrimination reported the worse engagement in the ninth grade and throughout high school.

Conclusion—The combination of poor sleep quality and high levels of discrimination in ninth grade has downstream consequences for adolescent academic outcomes. This study applies the biopsychosocial model to understand the development and daily experiences of diverse adolescents.

Keywords

sleep; ethnic/racial discrimination; school engagement

Students show declines in their school engagement and achievement as they move from eighth to ninth grade (Allensworth & Easton, 2007) with more students failing in ninth grade than any other year of school (Smith, 2006). This is especially problematic because the consequences extend far past ninth grade. Students' grades and level of engagement as

Correspondence concerning this article should be addressed to Margaret Dunbar, 63 Hamilton Terrace, Unit 37, New York, NY 10031. margaretdunbar13@gmail.com.

Margaret Dunbar, Sheena Mirpuri, and Tiffany Yip, Applied Developmental Psychology Program, Fordham University.

Margaret Dunbar is now at NYC Outward Bound Schools. Sheena Mirpuri is now at the Immigrant Health and Cancer Disparities Service, Department of Psychiatry and Behavioral Sciences, Memorial Sloan Kettering Cancer Center.

freshmen strongly predict academic success or failure later in high school (Neild, 2009; Roderick, 2006). Researchers have posited various explanations for academic declines during ninth grade, involving the complex interplay of biological, social, and institutional factors. In the current study, we take a biopsychosocial perspective (Engel, 1977), in which health and well-being are determined by complex, reciprocal interactions between various social and biological characteristics. In this study, we examine how sleep (i.e., biological) and discrimination experiences (i.e., social) factors interact during this critical transition period to jointly initiate a potential cascade of effects that contribute to engagement and academic trajectories across high school. Although our primary research question involves how sleep affects academic outcomes among a diverse group of adolescents, we also consider the ethnic/racial context (Lee, Spencer, & Harpalani, 2003). Thus, we consider how discrimination might exacerbate the effects of poor sleep on educational outcomes in the ninth grade and through high school. The biopsychosocial approach (Engel, 1977) leads to the hypothesis that sleep may be differentially related to academic outcomes depending upon levels of discrimination.

Transition concerns are relevant to all students. Among the most-cited explanations for the decline is that students have difficulty adjusting to a new schedule and increased academic demands (Elias, 2001; Odegaard & Heath, 1992). For this reason, the adjustment to high school may precipitate changes in not only class schedules, but sleep schedules. High schools frequently start earlier in the morning than elementary and middle schools, and students have increased academic, extracurricular, and social commitments. As school engagement declines during adolescence, sleep quality and duration decrease (Gellis, 2011).

Beyond changing schedules, research on the transition has emphasized stressors and opportunities of a new social environment as students move from middle to high school (Schiller, 1999), and the need to navigate issues of identity and belonging. This new social environment involves a number of stressors, including more frequent experiences with ethnic/racial discrimination (Greene, Way, & Pahl, 2006; Juang & Cookston, 2009). Ethnic/racial discrimination may be especially pernicious during this period since adolescents are in the midst of identity (including ethnic/racial identity) formation, and peer acceptance and belonging has increased importance (Eccles & Wigfield, 1997; Elias, 2001).

A recent review of the literature outlined a biopsychosocial and contextual model of sleep in adolescence (Becker, Langberg, & Byars, 2015). The 2015 Sleep Research Monograph included a call to action, urging an increased focus on sociocultural issues that would help us understand the contexts in which sleep influences development (Lukowski & Bell, 2015). Ethnic/racial discrimination represents one such important sociocultural issue. While recent work has considered the prospective influence of sleep and discrimination on adolescents' adjustment (El-Sheikh, Tu, Saini, Fuller-Rowell, & Buckhalt, 2016) and mental health trajectories (Yip, 2015), the joint effects of these factors on academic trajectories remains understudied. Despite widespread declines in school engagement and grades as students begin high school, there are students who show academic resilience, maintaining high engagement and performance through this challenging transition. Thus, in accordance with a biopsychosocial framework, we hypothesize that sleep indicators, ethnic/racial discrimination and their interaction during this transition point exert negative effects on

academic performance across high school. We further predict that students who report healthy sleep and little to no discrimination in ninth grade will show academic resilience, reporting higher school engagement both initially and across high school.

Sleep and Academic Outcomes

Prior research using both naturalistic and experimental methods suggests that sleep problems negatively impact academic functioning (Shochat, Cohen-Zion, & Tzischinsky, 2014; Wolfson & Carskadon, 2003). Unsurprisingly, given the role of sleep in the cognitive consolidation of learning and memory (Diekelmann & Born, 2010), both objectively and subjectively measured sleep disturbances have been associated with diminished cognitive functioning in children and adolescents (Buckhalt, El-Sheikh, Keller, & Kelly, 2009; Sadeh, Gruber, & Raviv, 2003; Steenari et al., 2003). Earlier research suggested that students who described themselves as struggling in school reported less and poorer-quality sleep than those without academic difficulties (Link & Ancoli-Israel, 1995). Later studies have supported these findings, and suggested that differences in these sleep variables distinguished students reporting grades of Cs or worse from those reporting mostly Bs or better (Wolfson & Carskadon, 1998; M. L. Wong et al., 2013). Poor sleep has been repeatedly linked to lower school engagement (Gillen-O'Neel, Huynh, & Fuligni, 2013) and achievement (Fallone, Acebo, Seifer, & Carskadon, 2005; Meijer, Habekothé, & Van Den Wittenboer, 2000). A recent meta-analysis found that sleep predicted academic success regardless of the measure of achievement (i.e., parent, teacher, or student report, or standardized test scores; Dewald, Meijer, Oort, Kerkhof, & Bögels, 2010).

Across studies, sleep is consistently related to academic functioning, although sleep quality may have a stronger association than sleep duration (Dewald et al., 2010). However, the current findings have largely been limited to samples of White, middle-class youth; thus, studies with diverse samples are necessary. The paucity of longitudinal studies is also clear —a recent review noted that only three of the many studies linking sleep and academic functioning were prospective (Shochat et al., 2014). A recent study by Tavernier and Willoughby (2014) is a notable exception. Examining bidirectional influences of sleep, intrapersonal adjustment, friendship quality, and academic achievement over 3 years, they found that higher academic grades predicted better overall sleep quality and lower sleep quantity during weekdays. However, their study sample was comprised of college students (ages 17 to 25), whose sleep and academic progression may not be comparable to those of younger adolescents. Examining prospective and longitudinal data is especially important when looking at high school academic outcomes, because recovering from low engagement and poor academic performance during the ninth grade to succeed later in high school has shown to be extremely challenging and rare (Allensworth & Easton, 2007), and cross-sectional studies may not accurately reflect this.

Finally, few studies have examined the manner in which youth characteristics moderate the sleep–academic performance relationship. Given the variety of ways that sleep is connected to adolescent development, researchers have underscored the importance of using an integrative framework to identify potential moderators that may exacerbate the effects of poor sleep (Becker et al., 2015).

Ethnic/Racial Discrimination as a Moderator

Ethnic/racial discrimination is defined as the perception of negative attitudes and unfair treatment toward members of a group (Banks, Kohn-Wood, & Spencer, 2006; Pascoe & Smart Richman, 2009) continues to be a frequent and deleterious experience for adolescents and adults across ethnic minority groups (Fisher, Wallace, & Fenton, 2000; Huynh, 2012; Ong, Burrow, Fuller-Rowell, Ja, & Sue, 2013; Sellers, Copeland-Linder, Martin, & Lewis, 2006). Indeed, ethnic/racial discrimination is a normative experience for ethnic/racial minorities, and the chronicity of discrimination suggests it may be best to consider it a continuous stressor, moderating the effects of other experiences. Literature on the stress process indicates that stressors may interact, such that one's ability to manage a transition or new stressor is affected by the burden and demands of preexisting stressors (Cohen, Janicki-Deverts, & Miller, 2007). Thus, experience with discrimination can increase an individual's vulnerability to other negative experiences by exacerbating the stress response initiated by unrelated, yet stressful experiences (Myers, 2009).

Previous work investigating discrimination as a moderator has examined ethnic/racial discrimination as a pervasive and contextual variable continually affecting the lives of minority individuals (Ghaffari, & Çiftçi, 2010; Murry, Brown, Brody, Cutrona, & Simons, 2001). In this conceptualization, ethnic/racial discrimination is viewed not only as a discrete stressful experience, but also as a social condition, which takes an ongoing toll by amplifying the effects of other forms of stress. Murry et al. (2001) found that those experiencing greater discrimination were more negatively affected by "stressor pile-up" (p. 917), resulting in more negative consequences when faced with new stressors, as well as reduced gain from protective factors. We expect to see the same pattern such that students would be more negatively affected by poor sleep if they reported greater discrimination during the ninth-grade transition and that students who experience greater discrimination will report a diminished benefit from high sleep quality.

As discussed above, entry to high school forces the transition to a new social environment. At this time, adolescents also spend less time at home, and more time with peers and strangers, which is accompanied by shifting frequencies of experiencing discrimination (Fisher et al., 2000; Hughes, Del Toro, Harding, Way, & Rarick, 2016). Adolescence is a critical developmental period (Crockett & Petersen, 1993), and these early experiences of discrimination inform an individual's pattern of responding to social stress (Adam et al., 2015; Brody et al., 2014; Geronimus, Hicken, Keene, & Bound, 2006). Research has suggested that among ethnic/racial minorities, flatter cortisol slopes were predicted by increased stress (DeSantis, Adam, Hawkley, Kudielka, & Cacioppo, 2015) and higher self-reported discrimination (Zeiders, Hoyt, & Adam, 2014). Those who experience frequent discrimination during adolescence may develop a negative stress response that extends past the initial exposure. A recent study by Adam and colleagues (2015) found that more frequent discrimination during adolescence prospectively predicted flatter diurnal cortisol slopes and lower waking cortisol during adulthood. Additionally, recent work has suggested that poor sleep may also influence cortisol reactivity in minority adolescents, such that those with more sleep problems and longer sleep duration had higher cortisol reactivity after a social stress test (Mrug, Tyson, Turan, & Granger, 2016). These changes in the functioning

of the hypothalamic-pituitary-adrenal axis are associated with depressive symptoms (Doane et al., 2013), as well as a decreased ability to cope with stressors (Dickerson & Kemeny, 2004). Adolescents with altered reactivity from these early experiences may be less able to show the resilience necessary for successful academic performance going forward.

The Interaction of Sleep and Discrimination

Though both sleep and discrimination are critical factors in the lives of adolescents, their relationship to each other has rarely been studied. This lack of scholarship is somewhat surprising, given that sleep disturbance has repeatedly been linked to stress (Sadeh, Keinan, & Daon, 2004) and ethnic/racial discrimination is a chronic stressor that disproportionately affects minorities (Kressin, Raymond, & Manze, 2008). Despite conceptual links, empirical studies examining the relationship between discrimination and sleep have been somewhat infrequent. Thomas, Bardwell, Ancoli-Israel, and Dimsdale (2006) found that among both African American and White adults, discrimination was associated with less slow-wave sleep, which is thought to be important for cognitive functioning. Similarly, Beatty and colleagues (2011) found that those who reported higher levels of generalized unfair treatment, although not specifically limited to ethnic/racial discrimination, experienced shorter and poorer-quality sleep, as well as increased daytime sleepiness. While these studies have suggested that sleep and discrimination are related, few have examined models considering the interaction between sleep and discrimination on youth development. One recent study found that adolescents experiencing greater discrimination and shorter sleep duration reported higher externalizing behaviors but that there was no such moderating effect for depression and anxiety (El-Sheikh et al., 2016). Another study considered the potential interaction between sleep and discrimination in predicting adolescent depressive symptoms and self-esteem (Yip, 2015). The interaction between sleep quality and discrimination predicted depressive symptoms and self-esteem across high school. Both studies suggest that students experiencing high discrimination and low sleep quality and duration are at the highest risk. Using the same sample as (Yip, 2015), we hypothesize that a similar pattern will emerge for academic outcomes.

The Current Study

Academic performance, in particular school engagement, tends to decline as adolescents progress through high school (Finn, 1989, 2006). Prior research suggests that both discrimination and sleep likely affect academic achievement (Benner & Kim, 2009; Chavous, Rivas-Drake, Smalls, Griffin, & Cogburn, 2008; Shochat et al., 2014; Wolfson & Carskadon, 2003). The current study examines how sleep quality, sleep duration, and frequency of discrimination in ninth grade affect student-reported grades and school engagement over a 3-year period. Specifically, the study explores how sleep and ethnic/racial discrimination may interact over time to influence academic outcomes. We expect that poor sleep and high levels of discrimination in ninth grade will be associated with lower initial levels of academic outcomes. Moving beyond the high school transition period, we hypothesize that the interaction of sleep and discrimination will have longitudinal effects such that academic outcomes will decline most steeply for adolescents who report poor sleep

and high levels of discrimination and will decline least or not at all for adolescents who have better sleep and lower levels of discrimination.

Method

Participants

Participants were recruited as part of a longitudinal study from five New York City public schools chosen based on their similar size and academic record. The schools included a majority-Asian school, a majority-Hispanic school, a majority-White school, and two racially heterogeneous schools. Students in all schools were equally represented in the total sample of 404 adolescents. While most participants completed all or almost all of their nightly surveys, some participants had missing nights of survey data, or specifically skipped the questions on sleep. To maintain the integrity of the data analyses, participants who reported their sleep less than three of the seven nights were excluded from analysis, yielding a sample of 310 adolescents. There were no significant differences in Time 1 discrimination, $t(399) = -.75$, $p = .10$, or school engagement, $t(392) = 1.48$, $p = .79$, between the students excluded due to missing data and those in the subsample used for analysis. There were also no differences in any of the control variables: depressive symptoms, academic expectations and aspirations, or academic behavioral orientation. There was a significant difference in the grades reported at Time 1, $t(391) = -3.38$, $p = .05$, with the excluded students reporting somewhat lower grades than those included in the sample (mean difference = .66).

The sample was ethnically/racially diverse: 1.6% American Indian, 10.7% African American, 24% Hispanic, 38% Asian, 22.7% White, and 2.9% other (including biracial individuals). Among Asian students, the majority were Chinese (72%), followed by Korean (5%) and Japanese (1%), with the rest identifying as Asian–other (22%). Among Hispanic students, students indicated that they were Dominican (25%), Puerto Rican (25%), South American (20%), Central American (4%), and Hispanic or Latino–other (26%). The mean age at Time 1 was 14.47 years ($SD = .78$). The majority of students were born in the United States (82%). Of the students who were born abroad, the most common country of origin was China. Females were overrepresented, making up 64.1% of the sample. Most students reported that they did not know their parents' highest education levels (27.4%) or that their parents had completed high school (23.8%). Adolescents reported living in neighborhoods where the average median income was between $50,000 and $75,000. The average median income for New York City during the years of the study (2008–2011) was approximately $54,000 (U.S. Census Bureau, 2006–2010).

Procedure

Students began participation in ninth grade and continued for 3 years. Study procedures were approved by all relevant institutional review boards. Once schools were selected, the parents of all ninth-grade students were invited to participate in the study. After signed consent forms were received, the research team met groups of 5–25 participants at their school to complete a survey. We refer to this first survey as the prediary survey. At this time, participants were provided a cellular phone to complete the daily diary portion of the study. For the next 7 days, participants completed a short survey on the phones' online browsers

each night before bed. We refer to these surveys as daily diary surveys. Since the surveys were completed online, the research team could monitor participant compliance and observe a time stamp for each entry. The research team met with the participants again after the week was complete and administered another survey (referred to as the postdiary survey), which included self-reported academic variables. This procedure (i.e., prediary survey, daily diary, postdiary survey) was completed in the fall of each of the 3 years for a total of 3 pre- and postdiary surveys and 21 daily diary surveys. Because not all variables were administered at each time point, for the current analyses, we used the measures of discrimination and sleep from the first time point (i.e., Time 1), to prospectively predict the trajectory of academic variables across all six time periods. The participants were compensated $50 in the first year, and $70 and $90 in subsequent years.

Measures

The larger study included a number of measures of intergroup contact, mood, and activity. Only measures relevant to the current study are described here. Descriptive statistics are provided in Table 1.

Daily sleep quality—As part of the daily diary study in ninth grade, participants were asked to rate their previous night's sleep every night over the course of a week on a 5-point Likert scale from 0 (*very poor*) to 4 (*very good*). To create a between-persons score of sleep quality, the mean score across the seven nights was calculated. This method of creating a composite has been used previously (Keller, El-Sheikh, & Buckhalt, 2008; Yip, 2015). Since the current study is concerned with prospective relationships, only data from the first year of the study were used.

Daily sleep duration—As part of the daily diary study in ninth grade, participants were also asked two questions about sleep time: "What time did you go to bed last night?" and "What time did you wake up this morning?" Sleep duration was computed manually by summing the number of hours between when the participant reported going to bed and when they reported waking up. As with sleep quality, a mean of sleep duration was calculated for the seven nights to create a composite variable of sleep duration for between person comparisons. In order to test prospective associations, only data from the first year of the study were used.

Discrimination—During the prediary survey in the fall of their first year, students were administered the Daily Life Experiences (DLE) subscale of the Racism and Life Experiences measure (S. P. Harrell, 1997; S. P. Harrell, Merchant, & Young, 1997). The scale's internal reliability has been high when used with adolescents and young adults of diverse ethnic/racial backgrounds (.92–.94; S. P. Harrell et al., 1997; Ong & Edwards, 2008; Sellers et al., 2006). The DLE includes 17 discriminatory experiences (e.g., "My ideas were ignored because of my race/ethnicity") and asks participants to rate how frequently they have encountered each one in the past year on a 6-point Likert scale from 0 (*never*) to 5 (*very often*). Discrimination scores in this sample had a highly skewed distribution. To normalize the distribution, each item was recoded as 0 (*never happened*) or 1 (*happened at least once*). The count of items reported was then summed to create a composite score for

each student. This strategy has been used in other studies of adolescents to manage skewed DLE scores (Benner & Graham, 2013). Since the current study is interested in prospective associations, only discrimination data from the first year of the study were used.

School engagement—Adolescents were asked to self-report their school engagement in the fall and the spring of each year (i.e., the postdiary survey and the 6 month post survey). School engagement was measured with the 20-item School Engagement Versus Disaffection Scale (Furrer & Skinner, 2003), which has been used with high reliability across adolescents of varying ethnic groups (Furrer, 2010; Hurd & Sellers, 2013; Thompson & Gregory, 2011) and found to correspond with teacher reports of student focus (Fredricks & McColskey, 2012). Sample items include "When I am in class, I participate in class discussion," and "When I am in class, I feel worried." Each item is scored on 5-point Likert scale from 1 (*never*) to 5 (*all the time*). Disaffection items were reverse coded and responses from the 20 items were then averaged.

Grades—During the fall and spring of each year (i.e., the postdiary survey and the 6 month post survey) the students were asked to report the grades they mostly received on their most recent report card. Answers were coded from 1 (*mostly Fs*) to 9 (*mostly As*). The mean GPA for this sample was 7.40 (SD = 1.58), indicating that the majority of students reported receiving mostly As and Bs over the 3 years.

Control Variables

Depressive symptoms—Depressive symptoms are strongly related to adolescents' abnormal sleep patterns (Fuligni & Hardway, 2006) and have also been connected to discrimination (Sellers et al., 2006) and academic outcomes (Masten et al., 2005). We thus controlled for depressive symptoms at Level 1. Participants completed the Center for Epidemiology Depression Scale (Radloff, 1977) during the fall and spring of each year (i.e., the prediary survey and the 6 month post survey). The measure has been validated for adolescent populations (Radloff, 1991) and across ethnic groups (Grzywacz, Hovey, Seligman, Arcury, & Quandt, 2006; Roberts, 1980). Each of the 20 items are answered on a 5-point Likert scale from 1 (*never*) to 5 (*all the time*). The responses were summed for each participant, with some items reverse coded.

Daily napping—We also controlled for napping since it may affect measures of nighttime sleep. As part of the daily diary surveys, participants were asked to report if they took a nap that day. Answers were recorded on a 6-point scale from 0 (*none*) to 5 (*4+ hr*).

Academic aspirations and expectations—Academic aspirations and expectations are associated with school engagement and success (Beal & Crockett, 2010; Davis-Kean, 2005; Wang & Benner, 2014). In order to separate their effect from the variables of interest, we controlled for expectations at Level 1. During the fall and spring of each year (i.e., the postdiary survey and the 6 month post survey), the students were asked two questions about their educational aspirations and expectations: "How far would you like to go in school?" and "How far do you think you will actually go in school?" Both questions were rated from 1 (*finish some high school*) to 5 (*graduate from law, medical, or graduate school*). The mean

aspirations for this sample were very high, with the vast majority of students planning and expecting to graduate from a 4-year college.

Academic behavioral orientation—Academic behavioral orientation was measured with a 10-item engagement measure (Finn & Rock, 1997), which has three subscales: attendance, negative behaviors, and class preparedness. The survey was taken in the fall and spring of each year (i.e., the postdiary survey and the 6 month post survey). All items were scored on a scale from 0 (*never*) to 3 (*more than three times*). The Attendance subscale contained three questions on the frequency of absence from school and lateness. The Negative School Behavior subscale included items on the number of times the school had reprimanded the student for behavioral problems or contacted his or her parents regarding school rule violations. The school preparation items asked students to report how frequently students had come to class without homework completed, or without books and other materials. These items were then reverse coded to create a composite of preparedness.

Results

Descriptive Statistics

Students endorsed an average of 8 out of the 17 discriminatory stressors at Time 1. Consistent with similar research (El-Sheikh et al., 2016), *t* tests revealed that ethnic/racial minority students reported significantly higher levels of discrimination than did White students (mean difference = 3.00), $t(117) = -4.40$; $p < .001$. An analysis of variance found no significant differences in the frequency of discrimination reported among minority groups (i.e., among Black, Asian, and Hispanic students) or between males and females. Unconditional hierarchical linear modeling (HLM) revealed no gender or ethnic/racial group differences for school engagement or participant-reported grades in the ninth grade or over time.

Correlations between variables are reported in Table 2. School engagement and grades were positively correlated. School engagement was positively correlated to both sleep quality and sleep duration and was negatively correlated with discrimination. Grades were not correlated with discrimination or either sleep indicator. Discrimination had an inverse correlation with sleep quality. Sleep quality and duration had a positive correlation.

Data Analysis Overview

The analysis was comprised of two parallel sets of models: one predicting school engagement and one predicting students' self-reported grades. Because of the nested structure of the data (i.e., growth curves nested within adolescents), the analyses were conducted with HLM-7 (Bryk & Raudenbush, 1992). Because we had no a priori reasons to hypothesize exclusively linear models and because we had sufficient data to model nonlinear associations, both linear and quadratic terms were included in the growth-curve models. Two-level models were conducted with individual growth curves at Level 1 and between-persons differences at Level 2. Growth-curve analyses were conducted to estimate within-person trajectories at Level 1 using the six data points at which academic variables were collected. Between-persons effects from differences in sleep and ethnic/racial discrimination

were modeled at Level 2. Although some studies have included a third level to consider possible school effects, in this case there was inadequate power to model school effects at Level 3 (Raudenbush et al., 2011).

The effects of gender (0 = male, 1 = female), nativity status (0 = first generation, 1 = later generation), and minority status (0 = White, 1 = ethnic/racial minority) were also included as covariates at Level 2. We controlled for these given prior work suggesting possible differences in our outcomes of interest based on gender (e.g., Buchmann, DiPrete, & McDaniel, 2008), nativity status (e.g., Duong, Badaly, Liu, Schwartz, & McCarty, 2016), and minority status (e.g., Cauley & Jovanovich, 2006), and based on similar research including these control variables (e.g., Yip, 2015). Though previous research has indicated significant differences among ethnic/racial minority groups, in this sample we found no differences in discrimination frequency or the academic outcomes among Asian, Hispanic, and Black students on these variables. Therefore, the data were coded as 0 = White, 1 = ethnic/racial minority. A proxy of socioeconomic status, the average income for each participant's census block, was also included as a control variable; however, due to lack of significant findings, this was omitted from the final models. To isolate the effects of the variables of interest on school engagement and grades, other time-varying covariates were controlled at Level 1. Relevant controls (depressive symptoms, academic behavioral orientation, academic aspirations) were also added to the models. The equation for school engagement is presented below. A parallel analysis examining participant-reported grades was also conducted. The equation predicting school engagement controls for grades, and the equation predicting grades controls for school engagement.

Level 1 (individual growth curve, within person):

$$\begin{aligned}\text{School Engagement} &= P0 + P1 * (\text{Linear time}) \\ &+ P2 * (\text{Quadratic Time}) + P3 * (\text{Grades}) \\ &+ P4 * (\text{Educational Aspirations}) \\ &+ P5 * (\text{Academic Behavioral Orientation}) \\ &+ P6 * (\text{Depressive Symptoms}) + E\end{aligned}$$

Level 2 (individual differences, between persons):

$$\begin{aligned}P0 &= B00 + B01 * (\text{Discrimination}) + B02 * (\text{Sleep Quality}) \\ &+ B03 * (\text{Sleep Duration}) + B04 * (\text{Discrimination} * \text{Sleep Quality}) \\ &+ B05 * (\text{Discrimination} * \text{Sleep Duration}) \\ &+ B06 * (\text{Sleep Quality} * \text{Sleep Duration}) \\ &+ B07 * (\text{Discrimination} * \text{Quality} * \text{Duration}) \\ &+ B08 * (\text{Nap}) + B09 * (\text{Nativity Status}) + R0 \\ P1 &= B10 + B11 * (\text{Discrimination}) + B12 * (\text{Sleep Quality}) \\ &+ B13 * (\text{Sleep Duration}) + B14 * (\text{Discrimination} * \text{Sleep Quality}) \\ &+ B15 * (\text{Discrimination} * \text{Sleep Duration}) \\ &+ B16 * (\text{Sleep Quality} * \text{Sleep Duration}) \\ &+ B17 * (\text{Discrimination} * \text{Quality} * \text{Duration}) \\ &+ B18 * (\text{Nap}) + B19 * (\text{Nativity Status}) + R1 \\ P2 &= B20 + B21 * (\text{Discrimination}) + B22 * (\text{Sleep Quality}) \\ &+ B23 * (\text{Sleep Duration}) + B24 * (\text{Discrimination} * \text{Sleep Duration}) \\ &+ B25 * (\text{Discrimination} * \text{Sleep Duration}) \\ &+ B26 * (\text{Sleep Quality} * \text{Sleep Duration}) \\ &+ B27 * (\text{Discrimination} * \text{Quality} * \text{Duration}) + B28 * (\text{Nap}) \\ &+ B29 * (\text{Nativity Status}) + R2 \\ P3 &= B30 \\ P4 &= P40 \\ P5 &= B50 \\ P6 &= B60\end{aligned}$$

School engagement—Before testing the study hypotheses, an unconditional model for school engagement was estimated. The results are not reported in a table, but are described here. The unconditional model did not suggest a linear ($b = -.01$, $SE = .02$) or quadratic ($b = .005$, $SE = .004$) change over time but did suggest significant variability in Level 2 variance components ($p < .001$). Given the significant variability at Level 2, we proceeded to include individual-difference variables to Level 2 of the model. First, we included demographic controls and observed no differences in school engagement between White and minority students in the ninth grade ($b = .04$, $SE = .10$) nor over time ($b = -.04$, $SE = .06$ linear, $b = .003$, $SE = .01$ for quadratic). There was also no evidence for gender differences in school engagement ($b = .02$, $SE = .09$). The dummy variable for nativity status, however, was significant ($b = .25$, $SE = .11$, $p < .03$), indicating that first-generation immigrants had lower initial school engagement than participants of later generations. Thus, we retained nativity status for the full conditional models below.

Next, we tested the study hypotheses by examining whether school engagement differed according to individual differences in sleep quality, sleep duration, discrimination, and their interactions. These variables were added as Level 2 predictors of school engagement (see Table 3). Sleep quality was strongly associated with higher school engagement in the ninth grade (B02), and also significantly predicted linear (B12) and quadratic (B22) change in school engagement over time. Students with higher sleep quality were likely to be more engaged in the ninth grade, and show increases in engagement over time as compared to peers reporting lower sleep quality. In contrast, sleep duration was not significantly associated with school engagement in the ninth grade (B03) or over time (B13, B23).

The interaction of sleep quality and discrimination was significantly associated with engagement in the ninth grade (B04) and changes in school engagement over time (B14, B24). Students with higher sleep quality exhibited higher school engagement in the ninth grade than students with lower sleep quality (see Figure 1). As predicted, the interaction was also significant for school engagement over time. Participants who reported both high sleep quality and high discrimination showed no significant changes in school engagement over time ($b = .00$; $SE = .00$) and were thus chosen as the reference group. Adolescents reporting low sleep quality and low discrimination did not differ from the reference group, and also did not show changes in engagement over time. Adolescents reporting low levels of discrimination and high sleep quality, who were hypothesized to show the most optimal outcomes, did differ significantly from the reference group ($t = 40.40$; $p < .001$). Simple slopes revealed that this group showed significant increase in school engagement over time ($b = -0.07$, $SE = .04$, $p = .05$, linear; $b = .02$, $SE = .01$, $p < .01$, quadratic). School engagement for these students was comparable to that of the high-sleep quality, high-discrimination group in the ninth grade, but the trajectories diverged over time such that adolescents reporting low discrimination showed significantly higher engagement than those with higher discrimination but comparable sleep quality. Those students with the opposite characterization at Time 1 (high discrimination and low sleep quality) also differed significantly from the reference group ($t = 41.49$, $p < .001$). This group began with lower engagement than the other groups and was the only group to show declining engagement over time.

Self-reported grades—Next, the study explored the impact of sleep and discrimination on grades. First, an unconditional model was run with self-reported grades as the outcome to verify that there was significant variability in Level 2 units ($p < .001$). There was no evidence of a linear effect ($b = -.11$, $SE = .07$, $p = .13$) and the quadratic effect was only marginally significant ($b = .02$, $SE = .01$, $p = .10$). Plotting grades over time revealed an inverted U-shaped curve. To explore possible individual differences in grades over time, Level 2 variables were included in a conditional model. Sleep quality, sleep duration, and discrimination were associated with initial self-reported grades at Time 1 but there was no evidence that these variables affected change in grades over time.

Discussion

School engagement and performance tend to decline through adolescence, with interest in school generally decreasing from middle to high school (Eccles, Midgley, & Adler, 1984; Epstein & McPartland, 1976). Simultaneously, adolescents sleep less, and report an increase in sleep disturbances (Keyes, Maslowsky, Hamilton, & Schulenberg, 2015). The National Sleep Foundation found that most adolescents sleep less than the recommended 8–10 hr, and that departure from the recommendation only becomes more pronounced as youths progress through adolescence (Hirshkowitz et al., 2015). Sleep is critical to multiple key aspects of development, including academic functioning. However, analyzing the effect of sleep factors in isolation is not sufficient. A growing body of research suggests that inquiries into the effect of sleep on adolescent outcomes should consider the moderating role of other lifestyle factors. The current study examined the prospective effect of reported sleep and ethnic/racial discrimination in ninth grade on academic trajectories over the next 3 years.

As predicted, sleep quality in ninth grade was strongly associated both with school engagement that year and across time. This corroborates previous findings that sleep is longitudinally associated with academic outcomes (Gillen-O'Neel et al., 2013). Sleep duration, on the other hand, showed no significant associations with school engagement. While previous research has found sleep duration to be associated with academic functioning (Shochat et al., 2014), sleep quality has been considered a more robust predictor (Dewald et al., 2010). Treating sleep duration as a continuous variable may obscure potential threshold effects. For example, an adolescent sleeping 10 hr a night and another sleeping only 8 hr may be getting sufficient sleep for their respective needs. While most students require 8 or 9 hr of sleep to function optimally, there are sizable individual differences with healthy sleep durations ranging anywhere from 6 to 11 hr (Hirshkowitz et al., 2015). That is, research has suggested that the amount of sleep individuals require per night may vary considerably (Ferrara & De Gennaro, 2001), and that these differences may be due to genetic reasons (Tucker, Dinges, & Van Dongen, 2007). Therefore, future research should consider multiple methods of categorizing sleep duration to determine whether there are meaningful thresholds, and what those thresholds may be for adolescents of various ages, backgrounds, and sociocultural challenges.

In line with previous findings, more frequent discrimination in ninth grade was associated with lower school engagement that year (Benner & Graham, 2011; Smalls, White, Chavous, & Sellers, 2007). Discrimination did not, however, significantly influence prospective

changes in school engagement over time. Previous studies have observed discrimination to predict trajectories of school engagement; however, these studies assessed discrimination at each time point, rather than just initial levels of reported discrimination (Chavous et al., 2008; C. A. Wong, Eccles, & Sameroff, 2003). Therefore, the prospective nature of the current study may have limited our ability to observe concurrent associations.

It is important to note that discrimination predicted little variability in school engagement, and that when sleep was entered into the model, discrimination was no longer significant. At the same time, there was also no significant association between discrimination and self-reported grades, initially or over time. While this was contrary to our hypothesis, there may be several reasons for the lack of association. Though studies have found associations between discrimination and academic outcomes, effect sizes are typically small (e.g., −.04 in the work of Huynh & Fuligni, 2007). Furthermore, the source and domain of discrimination may matter. While some studies have tailored assessments of discrimination specifically to academic settings (Chavous et al., 2008; Eccles, Wong, & Peck, 2006), other studies, including the current study, use more general measures of discrimination that do not specify the source or the domain. Yet, recent research has found that source and domain of discrimination impacts its effects. Benner and Graham (2013) found that while experiences of discrimination in school negatively impacted academic performance, other types of discrimination did not, and instead exerted their impact on other facets of adolescents' lives (i.e., psychosocial adjustment, racial awareness). Because we are not able to isolate experiences of discrimination specific to academic settings, the ability to observe effects on academic outcomes may have been compromised. Additionally, although not a main research focus of the current study, we found that there were no differences between White and minority students in school engagement. Given prior work, we would expect disparities in academic outcomes. However, 67% of the White students in this sample were in the minority at their high schools and 78% were in the minority at their middle schools. Furthermore, 36.2% of our White participants were first- or second-generation immigrants. We also found that first-generation immigrants reported lower school engagement. Prior work has suggested that immigrant students often have greater cognitive engagement than native students (e.g., Chiu, Pong, Mori, & Chow, 2012); however, a recent meta-analysis (Duong et al., 2016) found that second-generation immigrant students outperformed first-generation immigrant students only on standardized test scores, suggesting that limited English-language proficiency may be the primary educational barrier for first-generation students. Other research has found no differences in engagement across first-, second-, or third-generation immigrant students (e.g., Rodriguez & Boutakidis, 2013). One possible explanation may be that language barriers may temporarily hamper engagement. Future research should consider these mechanisms.

Our results support the notion that sleep should be considered in conjunction with other factors like sociocultural stress. Initial differences in school engagement were driven primarily by sleep quality, with adolescents reporting high-quality sleep also reporting higher engagement and as compared to adolescents reporting lower-quality sleep. As predicted, discrimination moderated this relationship, exacerbating the negative effects of low sleep quality and influencing school engagement change over time. Thus, while all students with low sleep quality had similar initial levels of engagement, those who reported

more discrimination had a more negative path over time. The same is true for those with high sleep quality. At Time 1, adolescents reporting high sleep quality reported similar levels of engagement regardless of discrimination, but there were significant long-term differences. Those with high sleep quality and low discrimination showed significantly more positive engagement over time.

While most often considered a sociocultural experience, ethnic/racial discrimination is also an environmental and contextual condition that may fundamentally change one's physiology (Adam et al., 2015; C. J. P. Harrell et al., 2011). Adolescents who experience frequent discrimination may develop different reactions to stress than their peers, showing heightened reactivity or hypervigilance. Chronic exposure to stressors like discrimination may impact one's ability to effectively mobilize one's physiological reactions. This change in physiological reactivity may have a host of consequences, including exacerbating the negative effects of low-quality sleep, as in the current study.

Somewhat surprisingly, sleep and discrimination did not exert similar influences on grades and school engagement. Though both sleep and discrimination have been associated with grades in previous studies (Dewald et al., 2010; Huynh & Fuligni, 2010) neither was significant in the current study. Due to the relatively high performance of adolescents in this sample (over 50% of the sample reported getting "mostly As" or "As and Bs" at all six time points and less than 10% of the sample reported getting Cs or below at any point during the 3 years of the study), this may be related to a truncated range, which decreased variance. This would be consistent with previous research which has found that the impact of sleep on academic performance is most profound between students who reported earning As and Bs and those who reported mainly Cs or lower (Wolfson & Carskadon, 1998; M. L. Wong et al., 2013). Other work has also suggested that over time, grades may predict sleep quality rather than the other way around (Tavernier & Willoughby, 2014). These findings point to the importance of considering more than one component of academic success and suggest the need for future research to better understand the association between sleep and academic functioning.

Despite the important contribution, there were limitations to the current study. The longitudinal nature of this study, along with the utilization of a biopsychosocial framework (Engel, 1977), marks a contribution to the literature. Indeed, this framework allowed us to consider the joint influence of discrimination and sleep on academic outcomes. Since sleep, discrimination, and academic indict-ors are associated with one another both concurrently and longitudinally, future research should consider mediation models. In particular, it may be of interest to test the mediating role of sleep in examining the effect of discrimination on academic and mental health outcomes. While there has been some research into sleep as a mediator of discrimination (Steffen & Bowden, 2006), further analyses are needed, especially with adolescent participants. The current study was unable to test a mediation model because discrimination and sleep were measured concurrently thereby violating prerequisites for testing statistical mediation (Hayes, 2009). Future studies should utilize research designs that allow mediation analyses.

We also used a general measure of discrimination, and lack the ability to explore domain specific effects related to academics in particular (Benner & Graham, 2013). Recent work has also found ethnic/racial group differences in the source and frequency of discrimination experienced by diverse adolescents and in the effects of discrimination on academic outcomes over time (Hughes et al., 2016). Given these findings and noted differences between stereotypes about academics for Black and Hispanic students in comparison to Asian students, future research should include questions about the source and domain of discrimination as well as explore potential differences between minority groups. Contrary to previous research, which has found that Asian students have higher academic performance than their Black and Hispanic peers (Farkas, 2003; Gándara & Contreras, 2009), there were no significant differences among ethnic/racial groups in the current sample. There was also no difference in reported school engagement which have been found in previous research (Huynh & Fuligni, 2008). This is likely an effect of the schools from which participants were drawn, which were in a diverse, urban setting, and were known to be high achieving. These very specific sample characteristics minimized our ability to investigate between-groups differences which may be more apparent in other contexts. Given previous work on the academic resilience of Asian students faced with discrimination (Chao, 1994; Kao, 2000), the additive effects of discrimination and sleep may be somewhat less pernicious to the school engagement of this group than it is for Black and Hispanic students. Future research should investigate potential differences in the manner that sleep and discrimination affect the academic trajectories of students of different minority groups.

In addition, the current study relied on self-reported sleep data, and only included collected data on sleep at Time 1. While subjective reports of sleep are meaningful predictors of academic and psychosocial outcomes, they are subject to response bias. Additionally, sleep duration was derived from the question, “What time did you go to bed last night?” rather than “What time did you fall asleep last night?” Since we could not account for sleep latency, sleep duration in this case indicated time in bed rather than time asleep. Future research should include objective measures of sleep. Relatedly, the current study did not assess chronotype: individual preference for bed and rising times, based on human circadian clocks (Roenneberg, Wirz-Justice, & Merrow, 2003). Research has found that evening chronotypes may be associated with poorer sleep quality (Rique, Fernandes Filho, Ferreira, & de Sousa-Muñoz, 2014) and lower health-related quality of life (Roeser, Brückner, Schwerdtle, Schlarb, & Kübler, 2012). During adolescence, a shift toward an evening preference occurs (Roenneberg et al., 2007), which may negatively impact academic outcomes (Beşoluk, Onder, & Deveci, 2011; Preckel et al., 2013). Finally, there were limitations regarding the academic-outcomes data. Adolescent self-report of academic performance and engagement is subject to possible reporting biases. Furthermore, as mentioned in the description of sample characteristics, students excluded from the analysis had lower grades, yielding a final sample that was relatively high performing. The magnitude of the relationships among sleep, discrimination, and academic outcomes may be different for lower-performing students.

Limitations notwithstanding, the current study’s findings on the interaction of sleep and discrimination are an important addition to the literature examining the biopsychosocial framework (Engel, 1977), and they provide additional support for the influence of both

discrimination and sleep quality on adolescent development (El-Sheikh et al., 2016; Yip, 2015). Future research should investigate the complex interactions among social stressors, physiological responses, and other biological variables. Given the projected increase in minority youth over the next several decades (Colby & Ortman, 2015), it is important to consider the various ways in which sociocontextual factors (i.e., discrimination) and biological factors (i.e., sleep duration and quality) contribute in meaningful ways to successful outcomes for minority youth. Thus, it is vital for interventions to adopt a biopsychosocial perspective and address these concerns in order to be relevant, well targeted, and effective.

References

Adam EK, Heissel JA, Zeiders KH, Richeson JA, Ross EC, Ehrlich KB, … Eccles JS. Developmental histories of perceived racial discrimination and diurnal cortisol profiles in adulthood: A 20-year prospective study. Psychoneuroendocrinology. 2015; 62:279–291. DOI: 10.1016/j.psyneuen.2015.08.018 [PubMed: 26352481]

Allensworth EM, Easton JQ. What matters for staying on-track and graduating in Chicago public high schools: A close look at course grades, failures, and attendance in the freshman year. 2007. Retrieved from Consortium on Chicago School Research website: https://consortium.uchicago.edu/sites/default/files/publications/07%20What%20Matters%20Final.pdf

Banks KH, Kohn-Wood LP, Spencer M. An examination of the African American experience of everyday discrimination and symptoms of psychological distress. Community Mental Health Journal. 2006; 42:555–570. DOI: 10.1007/s10597-006-9052-9 [PubMed: 16897412]

Beal SJ, Crockett LJ. Adolescents' occupational and educational aspirations and expectations: Links to high school activities and adult educational attainment. Developmental Psychology. 2010; 46:258–265. DOI: 10.1037/a0017416 [PubMed: 20053022]

Beatty DL, Hall MH, Kamarck TA, Buysse DJ, Owens JF, Reis SE, … Matthews KA. Unfair treatment is associated with poor sleep in African American and Caucasian adults: Pittsburgh SleepSCORE project. Health Psychology. 2011; 30:351–359. DOI: 10.1037/a0022976 [PubMed: 21553979]

Becker SP, Langberg JM, Byars KC. Advancing a biopsychosocial and contextual model of sleep in adolescence: A review and introduction to the special issue. Journal of Youth and Adolescence. 2015; 44:239–270. DOI: 10.1007/s10964-014-0248-y [PubMed: 25552436]

Benner AD, Graham S. Latino adolescents' experiences of discrimination across the first 2 years of high school: Correlates and influences on educational outcomes. Child Development. 2011; 82:508–519. DOI: 10.1111/j.1467-8624.2010.01524.x [PubMed: 21410910]

Benner AD, Graham S. The antecedents and consequences of racial/ethnic discrimination during adolescence: Does the source of discrimination matter? Developmental Psychology. 2013; 49:1602–1613. DOI: 10.1037/a0030557 [PubMed: 23106845]

Benner AD, Kim SY. Experiences of discrimination among Chinese American adolescents and the consequences for socioemotional and academic development. Developmental Psychology. 2009; 45:1682–1694. DOI: 10.1037/a0016119 [PubMed: 19899924]

Beşoluk S, Onder I, Deveci I. Morningness– eveningness preferences and academic achievement of university students. Chronobiology International. 2011; 28:118–125. DOI: 10.3109/07420528.2010.540729 [PubMed: 21231873]

Brody GH, Lei MK, Chae DH, Yu T, Kogan SM, Beach SR. Perceived discrimination among African American adolescents and allostatic load: A longitudinal analysis with buffering effects. Child Development. 2014; 85:989–1002. DOI: 10.1111/cdev.12213 [PubMed: 24673162]

Bryk AS, Raudenbush SW. Hierarchical linear models: Applications and data analysis methods. Thousand Oaks, CA: Sage; 1992.

Buchmann C, DiPrete TA, McDaniel A. Gender inequalities in education. Annual Review of Sociology. 2008; 34:319–337. DOI: 10.1146/annurev.soc.34.040507.134719

Buckhalt JA, El-Sheikh M, Keller PS, Kelly RJ. Concurrent and longitudinal relations between children's sleep and cognitive functioning: The moderating role of parent education. Child Development. 2009; 80:875–892. DOI: 10.1111/j.1467-8624.2009.01303.x [PubMed: 19489909]

Cauley KM, Jovanovich D. Developing an effective transition program for students entering middle school or high school. Clearing House: A Journal of Educational Strategies, Issues and Ideas. 2006; 80:15–25. DOI: 10.3200/TCHS.80.1.15-25

Chao RK. Beyond parental control and authoritarian parenting style: Understanding Chinese parenting through the cultural notion of training. Child Development. 1994; 65:1111–1119. DOI: 10.2307/1131308 [PubMed: 7956468]

Chavous TM, Rivas-Drake D, Smalls C, Griffin T, Cogburn C. Gender matters, too: The influences of school racial discrimination and racial identity on academic engagement outcomes among African American adolescents. Developmental Psychology. 2008; 44:637–654. DOI: 10.1037/0012-1649.44.3.637 [PubMed: 18473633]

Chiu MM, Pong SL, Mori I, Chow BW. Immigrant students' emotional and cognitive engagement at school: A multilevel analysis of students in 41 countries. Journal of Youth and Adolescence. 2012; 41:1409–1425. DOI: 10.1007/s10964-012-9763-x [PubMed: 22484548]

Cohen S, Janicki-Deverts D, Miller GE. Psychological stress and disease. Journal of the American Medical Association. 2007; 298:1685–1687. DOI: 10.1001/jama.298.14.1685 [PubMed: 17925521]

Colby SL, Ortman JM. Projections of the size and composition of the US population: 2014 to 2060. 2015. Retrieved from https://www.census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf

Crockett LJ, Petersen AC. Adolescent development: Health risks and opportunities for health promotion. In: Millstein SG, Petersen AC, Nightingale EO, editorsPromoting the health of adolescents: New directions for the twenty-first century. New York, NY: Oxford University Press; 1993. 13–37.

Davis-Kean PE. The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. Journal of Family Psychology. 2005; 19:294–304. DOI: 10.1037/0893-3200.19.2.294 [PubMed: 15982107]

DeSantis AS, Adam EK, Hawkley LC, Kudielka BM, Cacioppo JT. Racial and ethnic differences in diurnal cortisol rhythms: Are they consistent over time? Psychosomatic Medicine. 2015; 77:6–15. DOI: 10.1097/PSY.0000000000000131 [PubMed: 25548989]

Dewald JF, Meijer AM, Oort FJ, Kerkhof GA, Bögels SM. The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. Sleep Medicine Reviews. 2010; 14:179–189. DOI: 10.1016/j.smrv.2009.10.004 [PubMed: 20093054]

Dickerson SS, Kemeny ME. Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. Psychological Bulletin. 2004; 130:355–391. DOI: 10.1037/0033-2909.130.3.355 [PubMed: 15122924]

Diekelmann S, Born J. The memory function of sleep. Nature Reviews Neuroscience. 2010; 11:114–126. [PubMed: 20046194]

Doane LD, Mineka S, Zinbarg RE, Craske M, Griffith JW, Adam EK. Are flatter diurnal cortisol rhythms associated with major depression and anxiety disorders in late adolescence? The role of life stress and daily negative emotion. Development and Psychopathology. 2013; 25:629–642. DOI: 10.1017/S0954579413000060 [PubMed: 23880381]

Duong MT, Badaly D, Liu FF, Schwartz D, McCarty CA. Generational differences in academic achievement among immigrant youths: A meta-analytic review. Review of Educational Research. 2016; 86:3–41. DOI: 10.3102/0034654315577680

Eccles JS, Midgley C, Adler T. Grade-related changes in the school environment: Effects on achievement motivation. In: Nicholls JG, editorThe development of achievement motivation. Greenwich, CT: JAI Press; 1984. 283–331.

Eccles JS, Wigfield A. Young adolescent development. In: Irvin JL, editorWhat current research says to the middle level practitioner. Columbus, OH: National Middle School Association; 1997. 15–29.

Eccles JS, Wong CA, Peck SC. Ethnicity as a social context for the development of African-American adolescents. Journal of School Psychology. 2006; 44:407–426. DOI: 10.1016/j.jsp.2006.04.001

Elias MI. Easing transitions with social-emotional learning. Principal Leadership. 2001; 1:20–25.

El-Sheikh M, Tu KM, Saini EK, Fuller-Rowell TE, Buckhalt JA. Perceived discrimination and youths' adjustment: Sleep as a moderator. Journal of Sleep Research. 2016; 25:70–77. DOI: 10.1111/jsr.12333 [PubMed: 26260026]

Engel GL. The need for a new medical model: A challenge for biomedicine. Science. 1977; 196:129–136. DOI: 10.1126/science.847460 [PubMed: 847460]

Epstein JL, McPartland JM. The concept and measurement of the quality of school life. American Educational Research Journal. 1976; 13:15–30. DOI: 10.3102/00028312013001015

Fallone G, Acebo C, Seifer R, Carskadon MA. Experimental restriction of sleep opportunity in children: Effects on teacher ratings. Sleep. 2005; 28:1561–1567. [PubMed: 16408416]

Farkas G. Racial disparities and discrimination in education: What do we know, how do we know it, and what do we need to know? Teachers College Record. 2003; 105:1119–1146. DOI: 10.1111/1467-9620.00279

Ferrara M, De Gennaro L. How much sleep do we need? Sleep Medicine Reviews. 2001; 5:155–179. DOI: 10.1053/smrv.2000.0138 [PubMed: 12531052]

Finn JD. Withdrawing from school. Review of Educational Research. 1989; 59:117–142. DOI: 10.2307/1170412

Finn JD. The adult lives of at-risk students: The roles of attainment and engagement in high school: Report to the National Center of Educational Statistics. Washington, DC: U.S. Department of Education, National Center of Educational Statistics; 2006. 2006–2328.

Finn JD, Rock DA. Academic success among students at risk for school failure. Journal of Applied Psychology. 1997; 82:221–234. DOI: 10.1037/0021-9010.82.2.221 [PubMed: 9109280]

Fisher CB, Wallace SA, Fenton RE. Discrimination distress during adolescence. Journal of Youth and Adolescence. 2000; 29:679–695. DOI: 10.1023/A:1026455906512

Fredricks JA, McColskey W. The measurement of student engagement: A comparative analysis of various methods and student self-report instruments. In: Christenson SL, Reschly AL, Wylie C, editorsHandbook of research on student engagement. New York, NY: Springer; 2012. 763–782.

Fuligni AJ, Hardway C. Daily variation in adolescents' sleep, activities, and psychological well-being. Journal of Research on Adolescence. 2006; 16:353–378. DOI: 10.1111/j.1532-7795.2006.00498.x

Furrer CJ. Capturing the friendship context with a collective property: Friendship group engagement vs. disaffection. Journal of Adolescence. 2010; 33:853–867. DOI: 10.1016/j.adolescence.2010.07.003 [PubMed: 20732710]

Furrer C, Skinner E. Sense of relatedness as a factor in children's academic engagement and performance. Journal of Educational Psychology. 2003; 95:148–162. DOI: 10.1037/0022-0663.95.1.148

Gándara PC, Contreras F. The Latino education crisis: The consequences of failed social policies. Cambridge, MA: Harvard University Press; 2009.

Gellis L. Children's sleep in the context of socioeconomic status, race, and ethnicity. In: El-Sheikh M, editorSleep and development: Familial and socio-cultural considerations. New York, NY: Oxford University Press; 2011. 219–244.

Geronimus AT, Hicken M, Keene D, Bound J. "Weathering" and age patterns of allostatic load scores among Blacks and Whites in the United States. American Journal of Public Health. 2006; 96:826–833. DOI: 10.2105/AJPH.2004.060749 [PubMed: 16380565]

Ghaffari A, Çiftçi A. Religiosity and self-esteem of Muslim immigrants to the United States: The moderating role of perceived discrimination. International Journal for the Psychology of Religion. 2010; 20:14–25. DOI: 10.1080/10508610903418038

Gillen-O'Neel C, Huynh VW, Fuligni AJ. To study or to sleep? The academic costs of extra studying at the expense of sleep. Child Development. 2013; 84:133–142. DOI: 10.1111/j.1467-8624.2012.01834.x [PubMed: 22906052]

Greene ML, Way N, Pahl K. Trajectories of perceived adult and peer discrimination among Black, Latino, and Asian American adolescents: Patterns and psychological correlates. Developmental Psychology. 2006; 42:218–236. DOI: 10.1037/0012-1649.42.2.218 [PubMed: 16569162]

Grzywacz JG, Hovey JD, Seligman LD, Arcury TA, Quandt SA. Evaluating short-form versions of the CES-D for measuring depressive symptoms among immigrants from Mexico. Hispanic Journal of Behavioral Sciences. 2006; 28:404–424. DOI: 10.1177/0739986306290645

Harrell CJP, Burford TI, Cage BN, Nelson TM, Shearon S, Thompson A, Green S. Multiple pathways linking racism to health outcomes. Du Bois Review. 2011; 8:143–157. DOI: 10.1017/S1742058X11000178 [PubMed: 22518195]

Harrell SP. Unpublished instrument. Graduate School of Education and Psychology, Pepperdine University; Los Angeles, CA: 1997. The Racism and Life Experience Scales.

Harrell SP, Merchant MA, Young SA. Psychometric properties of the Racism and Life Experiences Scales (RaLES). Paper presented at the Annual Convention of the American Psychological Association; Chicago, IL. 1997 Aug.

Hayes AF. Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. Communication Monographs. 2009; 76:408–420. DOI: 10.1080/03637750903310360

Hirshkowitz M, Whiton K, Albert SM, Alessi C, Bruni O, Don-Carlos L, … Ware JC. National Sleep Foundation's updated sleep duration recommendations: Final report. Sleep Health. 2015; 1:233–243. DOI: 10.1016/j.sleh.2015.10.004 [PubMed: 29073398]

Hughes D, Del Toro J, Harding JF, Way N, Rarick JR. Trajectories of discrimination across adolescence: Associations with academic, psychological, and behavioral outcomes. Child Development. 2016; 87:1337–1351. DOI: 10.1111/cdev.12591 [PubMed: 27684390]

Hurd NM, Sellers RM. Black adolescents' relationships with natural mentors: Associations with academic engagement via social and emotional development. Cultural Diversity and Ethnic Minority Psychology. 2013; 19:76–85. DOI: 10.1037/a0031095 [PubMed: 23356358]

Huynh VW. Ethnic microaggressions and the depressive and somatic symptoms of Latino and Asian American adolescents. Journal of Youth and Adolescence. 2012; 41:831–846. DOI: 10.1007/s10964-012-9756-9 [PubMed: 22453294]

Huynh VW, Fuligni AJ. Ethnic socialization, discrimination, and the academic adjustment of adolescents from Latin American, Asian, and European backgrounds. Los Angeles, CA: University of California, Los Angeles, California Center for Population Research; 2007. Report No. CCPR-013–07

Huynh VW, Fuligni AJ. Ethnic socialization and the academic adjustment of adolescents from Mexican, Chinese, and European backgrounds. Developmental Psychology. 2008; 44:1202–1208. DOI: 10.1037/0012-1649.44.4.1202 [PubMed: 18605847]

Huynh VW, Fuligni A. Discrimination hurts: The academic, psychological, and physical well-being of adolescents. Journal of Research on Adolescence. 2010; 20:916–941. DOI: 10.1111/j.1532-7795.2010.00670.x

Juang LP, Cookston JT. Acculturation, discrimination, and depressive symptoms among Chinese American adolescents: A longitudinal study. Journal of Primary Prevention. 2009; 30(3–4):475–496. DOI: 10.1007/s10935-009-0177-9 [PubMed: 19381814]

Kao G. Group images and possible selves among adolescents: Linking stereotypes to expectations by race and ethnicity. Sociological Forum. 2000; 15:407–430. DOI: 10.1023/A:1007572209544

Keller PS, El-Sheikh M, Buckhalt JA. Children's attachment to parents and their academic functioning: Sleep disruptions as moderators of effects. Journal of Developmental and Behavioral Pediatrics. 2008; 29:441–449. DOI: 10.1097/DBP.0b013e318182a9b4 [PubMed: 18714206]

Keyes KM, Maslowsky J, Hamilton A, Schulenberg J. The great sleep recession: Changes in sleep duration among US adolescents, 1991–2012. Pediatrics. 2015; 135:460–468. DOI: 10.1542/peds.2014-2707 [PubMed: 25687142]

Kressin NR, Raymond KL, Manze M. Perceptions of race/ethnicity-based discrimination: A review of measures and evaluation of their usefulness for the health care setting. Journal of Health Care for the Poor and Underserved. 2008; 19:697–730. DOI: 10.1353/hpu.0.0041 [PubMed: 18677066]

Lee CD, Spencer MB, Harpalani V. Every shut eye ain't sleep: Studying how people live culturally. Educational Researcher. 2003; 32:6–13. DOI: 10.3102/0013189X032005006

Link SC, Ancoli-Israel S. Sleep and the teenager. Sleep Research. 1995; 24:184.

Lukowski AF, Bell MA. On sleep and development: Recent advances and future directions. Monographs of the Society for Research in Child Development. 2015; 80:182–195. DOI: 10.1111/mono.12152 [PubMed: 25704743]

Masten AS, Roisman GI, Long JD, Burt KB, Obradović J, Riley JR, … Tellegen A. Developmental cascades: Linking academic achievement and externalizing and internalizing symptoms over 20 years. Developmental Psychology. 2005; 41:733–746. DOI: 10.1037/0012-1649.41.5.733 [PubMed: 16173871]

Meijer AM, Habekothé HT, Van Den Wittenboer GLH. Time in bed, quality of sleep and school functioning of children. Journal of Sleep Research. 2000; 9:145–153. DOI: 10.1046/j.1365-2869.2000.00198.x [PubMed: 10849241]

Mrug S, Tyson A, Turan B, Granger DA. Sleep problems predict cortisol reactivity to stress in urban adolescents. Physiology & Behavior. 2016; 155:95–101. DOI: 10.1016/j.physbeh.2015.12.003 [PubMed: 26679739]

Murry VM, Brown PA, Brody GH, Cutrona CE, Simons RL. Racial discrimination as a moderator of the links among stress, maternal psychological functioning, and family relationships. Journal of Marriage and Family. 2001; 63:915–926. DOI: 10.1111/j.1741-3737.2001.00915.x

Myers HF. Ethnicity- and socio-economic status-related stresses in context: An integrative review and conceptual model. Journal of Behavioral Medicine. 2009; 32:9–19. DOI: 10.1007/s10865-008-9181-4 [PubMed: 18989769]

Neild RC. Falling off track during the transition to high school: What we know and what can be done. Future of Children. 2009; 19:53–76. DOI: 10.1353/foc.0.0020 [PubMed: 21141705]

Odegaard SL, Heath IA. Assisting the elementary school student in the transition to a middle level school. Middle School Journal. 1992; 24:21–25. DOI: 10.1080/00940771.1992.11495163

Ong AD, Burrow AL, Fuller-Rowell TE, Ja NM, Sue DW. Racial microaggressions and daily well-being among Asian Americans. Journal of Counseling Psychology. 2013; 60:188–199. DOI: 10.1037/a0031736 [PubMed: 23421777]

Ong AD, Edwards LM. Positive affect and adjustment to perceived racism. Journal of Social and Clinical Psychology. 2008; 27:105–126. DOI: 10.1521/jscp.2008.27.2.105

Pascoe EA, Smart Richman L. Perceived discrimination and health: A meta-analytic review. Psychological Bulletin. 2009; 135:531–554. DOI: 10.1037/a0016059 [PubMed: 19586161]

Preckel F, Lipnevich AA, Boehme K, Brandner L, Georgi K, Könen T, … Roberts RD. Morningness–eveningness and educational outcomes: The lark has an advantage over the owl at high school. British Journal of Educational Psychology. 2013; 83(Pt 1):114–134. DOI: 10.1111/j.2044-8279.2011.02059.x [PubMed: 23369178]

Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. Applied Psychological Measurement. 1977; 1:385–401. DOI: 10.1177/014662167700100306

Radloff LS. The use of the Center for Epidemiologic Studies Depression Scale in adolescents and young adults. Journal of Youth and Adolescence. 1991; 20:149–166. DOI: 10.1007/BF01537606 [PubMed: 24265004]

Raudenbush SW, Spybrook J, Congdon R, Liu XF, Martinez A, Bloom H. Optimal design software for multi-level and longitudinal research (Version 3.01) [Software]. 2011. Available from www.wtgrantfoundation.org

Rique GLN, Fernandes Filho GMC, Ferreira ADC, de Sousa-Muñoz RL. Relationship between chronotype and quality of sleep in medical students at the Federal University of Paraiba, Brazil. Sleep Science. 2014; 7:96–102. DOI: 10.1016/j.slsci.2014.09.004 [PubMed: 26483910]

Roberts RE. Reliability of the CES-D Scale in different ethnic contexts. Psychiatry Research. 1980; 2:125–134. DOI: 10.1016/0165-1781(80)90069-4 [PubMed: 6932058]

Roderick M. Closing the aspirations–attainment gap: Implications for high school reform: A commentary from Chicago. New York, NY: MDRC; 2006.

Rodriguez JL, Boutakidis IP. The association between school engagement and achievement across three generations of Mexican American students. Journal of the Association of Mexican American Educators. 2013; 7:5–12.

Roenneberg T, Kuehnle T, Juda M, Kantermann T, Allebrandt K, Gordijn M, Merrow M. Epidemiology of the human circadian clock. Sleep Medicine Reviews. 2007; 11:429–438. DOI: 10.1016/j.smrv.2007.07.005 [PubMed: 17936039]

Roenneberg T, Wirz-Justice A, Merrow M. Life between clocks: Daily temporal patterns of human chronotypes. Journal of Biological Rhythms. 2003; 18:80–90. DOI: 10.1177/0748730402239679 [PubMed: 12568247]

Roeser K, Brückner D, Schwerdtle B, Schlarb AA, Kübler A. Health-related quality of life in adolescent chronotypes—A model for the effects of sleep problems, sleep-related cognitions, and self-efficacy. Chronobiology International. 2012; 29:1358–1365. DOI: 10.3109/07420528.2012.728664 [PubMed: 23131114]

Sadeh A, Gruber R, Raviv A. The effects of sleep restriction and extension on school-age children: What a difference an hour makes. Child Development. 2003; 74:444–455. DOI: 10.1111/1467-8624.7402008 [PubMed: 12705565]

Sadeh A, Keinan G, Daon K. Effects of stress on sleep: The moderating role of coping style. Health Psychology. 2004; 23:542–545. DOI: 10.1037/0278-6133.23.5.542 [PubMed: 15367075]

Schiller KS. Effects of feeder patterns on students' transition to high school. Sociology of Education. 1999; 72:216–233. DOI: 10.2307/2673154

Sellers RM, Copeland-Linder N, Martin PP, Lewis RH. Racial identity matters: The relationship between racial discrimination and psychological functioning in African American adolescents. Journal of Research on Adolescence. 2006; 16:187–216. DOI: 10.1111/j.1532-7795.2006.00128.x

Shochat T, Cohen-Zion M, Tzischinsky O. Functional consequences of inadequate sleep in adolescents: A systematic review. Sleep Medicine Reviews. 2014; 18:75–87. DOI: 10.1016/j.smrv.2013.03.005 [PubMed: 23806891]

Smalls C, White R, Chavous T, Sellers R. Racial ideological beliefs and racial discrimination experiences as predictors of academic engagement among African American adolescents. Journal of Black Psychology. 2007; 33:299–330. DOI: 10.1177/0095798407302541

Smith JS. Research summary: Transition from middle school to high school. 2006. Retrieved from National Middle School Association website: http://www.nmsa.org/Research/ResearchSummaries/TransitionfromMStoHS/tabid/1087/Default.aspx

Steenari MR, Vuontela V, Paavonen EJ, Carlson S, Fjällberg M, Aronen E. Working memory and sleep in 6- to 13-year-old schoolchildren. Journal of the American Academy of Child & Adolescent Psychiatry. 2003; 42:85–92. DOI: 10.1097/00004583-200301000-00014 [PubMed: 12500080]

Steffen PR, Bowden M. Sleep disturbance mediates the relationship between perceived racism and depressive symptoms. Ethnicity and Disease. 2006; 16:16–21. [PubMed: 16599343]

Tavernier R, Willoughby T. Bidirectional associations between sleep (quality and duration) and psychosocial functioning across the university years. Developmental Psychology. 2014; 50:674–682. DOI: 10.1037/a0034258 [PubMed: 23978302]

Thomas KS, Bardwell WA, Ancoli-Israel S, Dimsdale JE. The toll of ethnic discrimination on sleep architecture and fatigue. Health Psychology. 2006; 25:635–642. DOI: 10.1037/0278-6133.25.5.635 [PubMed: 17014281]

Thompson AR, Gregory A. Examining the influence of perceived discrimination during African American adolescents' early years of high school. Education and Urban Society. 2011; 43:3–25. DOI: 10.1177/0013124510379827

Tucker AM, Dinges DF, Van Dongen HP. Trait interindividual differences in the sleep physiology of healthy young adults. Journal of Sleep Research. 2007; 16:170–180. DOI: 10.1111/j.1365-2869.2007.00594.x [PubMed: 17542947]

U.S. Census Bureau. Selected social characteristics in the United States. 2010 American community survey 5-year estimates. 2006–2010. [Data]. Retrieved from http://factfinder2.census.gov

Wang Y, Benner AD. Parent–child discrepancies in educational expectations: Differential effects of actual versus perceived discrepancies. Child Development. 2014; 85:891–900. DOI: 10.1111/cdev.12171 [PubMed: 24116710]

Wolfson AR, Carskadon MA. Sleep schedules and daytime functioning in adolescents. Child Development. 1998; 69:875–887. DOI: 10.1111/j.1467-8624.1998.tb06149.x [PubMed: 9768476]

Wolfson AR, Carskadon MA. Understanding adolescent's sleep patterns and school performance: A critical appraisal. Sleep Medicine Reviews. 2003; 7:491–506. DOI: 10.1053/smrv.2002.0258 [PubMed: 15018092]

Wong CA, Eccles JS, Sameroff A. The influence of ethnic discrimination and ethnic identification on African American adolescents' school and socioemotional adjustment. Journal of Personality. 2003; 71:1197–1232. DOI: 10.1111/1467-6494.7106012 [PubMed: 14633063]

Wong ML, Lau EYY, Wan JHY, Cheung SF, Hui CH, Mok DSY. The interplay between sleep and mood in predicting academic functioning, physical health and psychological health: A longitudinal study. Journal of Psychosomatic Research. 2013; 74:271–277. DOI: 10.1016/j.jpsychores.2012.08.014 [PubMed: 23497826]

Yip T. The effects of ethnic/racial discrimination and sleep quality on depressive symptoms and self-esteem trajectories among diverse adolescents. Journal of Youth and Adolescence. 2015; 44:419–430. DOI: 10.1007/s10964-014-0123-x [PubMed: 24682960]

Zeiders KH, Hoyt LT, Adam EK. Associations between self-reported discrimination and diurnal cortisol rhythms among young adults: The moderating role of racial-ethnic minority status. Psychoneuroendocrinology. 2014; 50:280–288. DOI: 10.1016/j.psyneuen.2014.08.023 [PubMed: 25262035]

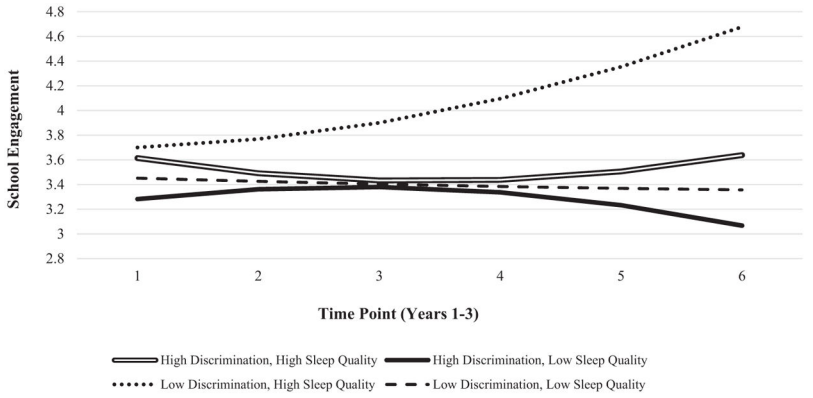

Figure 1.

School engagement trajectories by ethnic/racial discrimination and sleep quality. Cut-off scores of ± 1 *SD* classify the four groups.

Table 1

Descriptives

		Year 1				Year 2				Year 3			
		Time 1		Time 2		Time 3		Time 4		Time 5		Time 6	
Variable	**Range**	***M* (*SD*)**	**α**	***M* (*SD*)**	**α**	***M* (*SD*)**	**α**	***M* (*SD*)**	**α**	***M* (*SD*)**	**α**	***M* (*SD*)**	**α**
Control variables													
Depressive symptoms	21–91	42.36 (12.97)	.87	42.54 (12.01)	.85	41.98 (12.50)	.87	43.63 (14.79)	.86	41.86 (13.08)	.86	42.26 (12.47)	.82
Academic aspirations	1–5	4.4 (0.83)		4.38 (0.80)		4.44 (0.76)		4.45 (0.76)		4.48 (0.67)		4.52 (0.63)	
Academic expectations	1–5	4.18 (0.88)		4.19 (0.82)		4.31 (0.76)		4.38 (0.82)		4.31 (0.75)		4.29 (0.78)	
Behavioral orientation													
Attendance	0–4	1.01 (0.94)	.57	1.03 (1.04)	.62	1.10 (1.07)	.64	1.04 (1.15)	.69	1.19 (1.13)	.70	1.13 (1.17)	.68
Negative behavior	0–3.7	0.72 (0.92)	.74	0.59 (0.83)	.65	0.55 (0.82)	.70	0.43 (0.81)	.73	0.33 (0.62)	.63	0.20 (0.47)	.57
School preparation	0–3	1.24 (0.90)	.67	1.15 (0.93)	.72	1.10 (0.88)	.72	0.83 (0.86)	.77	0.89 (0.87)	.75	0.74 (0.85)	.77
Napping behavior (hr)		0.50 (0.72)											
Key variables													
Discrimination	0–22.3	8.34 (5.32)	.91										
Daily sleep quality	0–4	2.29 (0.84)											
Daily sleep duration (hr)	5–13	8.62 (1.42)											
School engagement	1.6–4.8	3.50 (0.54)	.79	3.53 (0.55)	.62	3.48 (0.52)	.69	3.56 (0.53)	.69	3.52 (0.53)	.65	3.57 (0.56)	.69
Grades	1–9	7.71 (1.60)		7.17 (1.67)		7.31 (1.69)		7.37 (1.69)		7.29 (1.76)		7.17 (1.77)	

Cultur Divers Ethnic Minor Psychol. Author manuscript; available in PMC 2018 August 14.

Table 2

Correlations Among Variables at Time 1

Variable	1	2	3	4	5
1. Discrimination	—				
2. Daily sleep quality	−.20**	—			
3. Daily sleep duration	−.01	.27**	—		
4. School engagement	−.18**	.28**	.04*	—	
5. Grades	−.05	.06	.02	.30**	—

*$p < .05$.

**$p < .01$.

Table 3

Within-Person School Engagement Growth Curves as a Function of Between-Persons Differences in Discrimination, Sleep Quality, and Sleep Duration

Level and variable		*B*	*SE*
School engagement (L1)	B00, G000	3.53***	.05
Discrimination (L2)	B01, G010	−.01	.01
Sleep quality (L2)	B02, G020	.26***	.05
Sleep duration (L2)	B03, G030	−.05	.03
Discrimination × Sleep Quality (L2)	B04, G040	.02**	.01
Discrimination × Sleep Duration (L2)	B05, G050	−.01	.01
Quality × Duration (L2)	B06, G060	.01	.03
Discrimination × Quality × Duration (L2)	B07, G070	−.01	.01
Nativity status (L2)	B08, G080	.18*	.10
Nap (L2)	B09, G090	−.25***	.07
Linear effect (L1)	B10, G100	−.03	.03
Discrimination (L2)	B11, G110	−.001	.005
Sleep quality (L2)	B12, G120	−.11***	.03
Sleep duration (L2)	B13, G130	.02	.02
Discrimination × Sleep Quality (L2)	B14, G140	−.02***	.01
Discrimination × Sleep Duration (L2)	B15, G150	.003	.004
Quality × Duration (L2)	B16, G160	−.01	.02
Nativity status (L2)	B17, G170	−.05	.07
Nap (L2)	B18, G180	.07*	.04
Quadratic effect (L1)	B20, G200	.01*	.004
Discrimination (L2)	B21, G210	.0003	.001
Sleep quality (L2)	B22, G220	.02***	.005
Sleep duration (L2)	B23, G230	−.003	.002
Discrimination × Sleep Quality (L2)	B24, G240	.003*	.001
Discrimination × Sleep Duration (L2)	B25. G250	−.004***	.0001
Quality × Duration (L2)	B26, G260	.004	.003
Nativity status (L2)	B27, G270	−.007	.01
Nap (L2)	B28, G280	−.01*	.01
Grades (L1)	B30, G300	.05***	.01
Academic aspirations (L1)	B40, G400	.03	.02
Academic behavioral orientation (L1)	B50, G500	−.13***	.02
Depressive symptoms (L1)	B60, G600	−.001	.001

Note. L1 indicates that the variable was included in Level 1 of the model. L2 indicates that the variable was included in Level 2 of the model. In accordance with American Psychological Association guidelines, all values are presented with two digits past the decimal except in cases where the coefficient is so small, it would be listed as 0. In these cases, we present values with up to four significant digits.

* $p < .10$.

** $p < .05$.

*** $p < .001$.