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Disproportionate School Punishment and Significant Life Outcomes: A Prospective Analysis of Black Youths

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Abstract

This study tested relationships between racial inequalities in the school system—specifically, the disproportionate punishment of Black students—and life outcomes for Black youths, along with moderating psychological factors. In an 18-year longitudinal study of 261 Black youths (ages 11–29), we investigated whether adult life outcomes varied as a function of adolescent self-control and academic achievement. We tested whether relationships were moderated by the racial climates of the high schools that youths attended, using administrative data on relative punishment rates of Black and White students. Among Black youths who attended schools that disproportionately punished Black students, high self-control in early adolescence presaged higher academic orientation in late adolescence, which in turn predicted higher educational attainment, higher income, and better mental health in adulthood. However, among these same youths, higher academic orientation forecasted higher adult insulin resistance, a key process in cardiometabolic disease. These findings suggest that achieving successes in life in the face of racial inequalities may come at a physical health cost for Black youths.

Keywords

minority groups, health, schools

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In the United States, pervasive race-based disparities have been observed across numerous life outcomes. For example, Black individuals are less likely to graduate high school or college and are more likely to be unemployed, to have lower earnings, to live in less valued homes, to be stopped by the police and arrested, and to suffer from a number of diseases and early mortality compared with White individuals (Pager & Shepherd, 2008; Pettit & Western, 2004; Reskin, 2012; Williams et al., 2010, 2016). These disparities stem from a number of structural and systemic causes, including the differential resources of schools serving predominantly Black versus White children (Duncan & Murnane, 2011), discrimination based on differential interviewing of equally qualified Black and White applicants (Pager et al., 2009), redlining practices to keep Black individuals from buying homes in certain neighborhoods (Pager & Shepherd, 2008; Reskin, 2012), and biases that lead to differential treatment of Black and White individuals in the health-care and law-enforcement systems (Pettit & Western, 2004; Smedley et al., 2003).

In the school setting as well, there are also clear racial disparities evident in disciplinary practices. Black students are more likely to receive office referrals, to be suspended, and to be expelled than White students (Fenning & Rose, 2007; Skiba et al., 2011; Townsend, 2000). These differences cannot be explained by differential rates of disruptive behaviors in Black students

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(Fenning & Rose, 2007; Skiba et al., 2011). Furthermore, Black students receive harsher punishments for the same or less serious infractions than White students (Okonofua & Eberhardt, 2015; Skiba et al., 2011).

The disproportionate punishment of Black students in school has implications for life outcomes. Students who experience school punishment, particularly expulsion, are significantly more likely to drop out of school, to have lower academic achievement, and to be at higher risk of incarceration (Rocque & Paternoster, 2011; Skiba et al., 2011; Townsend, 2000). Furthermore, dropping out of school is associated with a host of poor life outcomes in adulthood, including lower lifetime earnings, unemployment, and increased mental and physical illness (Okonofua et al., 2016).

In the face of these systemic inequities, how do Black students navigate a school environment in which they observe the disproportionate punishment of Black students? In particular, are there psychological resources that can help buffer Black students against the many negative life outcomes that occur in these environments? We hypothesize that high levels of self-control may be one such buffer. Self-control refers to the regulation of one's attention, emotions, and behaviors; being planful; and avoiding temptations, all in the service of achieving one's goals. Higher self-control in childhood longitudinally predicts numerous life outcomes in adulthood, including higher incomes, less substance use, and lower likelihood of criminal conviction (Moffitt et al., 2011). These patterns are also apparent in Black youths (Brody et al., 2013; Miller et al., 2015). In a school environment in which Black students receive disproportionate punishments, it may be that having high self-control is beneficial for two reasons. First, high self-control may reduce the likelihood of that student being the target of a school disciplinary action. Second, high self-control may help Black students maintain a strong academic orientation, despite the challenges their school environment presents. Indeed, higher self-control predicts better grades in school and higher educational attainment across numerous longitudinal studies (Duckworth et al., 2019).

In turn, maintaining high academic orientation has long-term implications for adulthood. Students with high academic orientation or school engagement over time have better grades, better mental health, and engage in less substance use and fewer delinquent behaviors (Li & Lerner, 2011). In adulthood, these students also attain higher levels of education and achieve higher-status occupations (Abbott-Chapman et al., 2014).

However, maintaining high self-control and academic orientation in a school environment that disproportionately punishes its Black students is not easy, and we hypothesize that there may be a toll that the stress of successfully navigating such environments takes on Black students. Along similar lines, previous research has found that for low-income students of color, the sustained effort that they have to invest in order to achieve academic success, while receiving fewer resources and supports, can result in a trade-off whereby economic success and positive mental health in adulthood come at the expense of physical health. This phenomenon is termed *skin-deep resilience*. For example, low-income Black youths who exhibit high levels of striving or self-control are more likely to finish college, to earn higher incomes, and to have better mental health; but at the same time, they are more likely to have a greater risk of diabetes, higher allostatic load (a multisystem indicator of physiological risk), and show faster epigenetic aging of immune cells (based on DNA methylation patterns that reflect the discrepancy between a person's biological and chronological age) compared with low-income Black youths who are low in striving and self-control or compared with high-income Black youths (Brody et al., 2013, 2016; Miller et al., 2015). In addition, Black and Latinx youths who exhibit high self-control in stressful school environments have better mental health (less anxiety and depression) but worse inflammatory profiles compared with those who show low self-control in stressful school

Statement of Relevance

Racial inequalities are pervasive in the United States and are a pressing societal issue that the country has faced for centuries. Understanding the impact of racial inequalities on life outcomes and the role that psychological science can play in this domain are important for policy and practice. This study investigated the relationship between racial inequality in the school setting—in particular, the disproportionate punishment of Black students in certain high schools—and adult levels of educational attainment, personal income, mental health, and physical health. Among Black youths who attended schools that disproportionately punished Black students, high self-control in early adolescence presaged higher academic orientation in late adolescence, which in turn predicted better outcomes in all life domains except physical health, in which higher insulin resistance—a key process in cardiometabolic disease—was found. These findings suggest characteristics that may be instrumental in helping individuals be resilient in the face of inequality-related adversities.

environments (Chen et al., 2019). "Skin-deep resilience" has been used to describe this pattern because it suggests that above the skin, low-income students of color with high self-control appear to be doing well and achieving success by many external metrics (going to college, earning good incomes, and having good mental health). However, under the skin, their efforts may be taking a toll: These students appear to be struggling physiologically in terms of health, thus displaying resilience that is only skin deep.

In the present study, we drew data from an 18-year longitudinal study to test hypotheses related to life outcomes for Black students in the Southern United States who attended schools with a variety of disproportionate school punishment rates. We hypothesized that there would be significant interactions between disproportionate school punishment rates and self-control on later academic orientation. Among Black students attending high schools that disproportionately punished Black students, we expected that high self-control in early adolescence would presage higher academic orientation in later adolescence. In contrast, in schools with relatively equal punishment rates across races, we hypothesized that self-control would make less of a difference for academic orientation.

Second, we hypothesized that there would be a divergence in associations between disproportionate school punishment and academic orientation during adolescence and adult life outcomes. That is, we expected that high academic orientation in adolescence would predict positive adult life outcomes, including higher educational attainment, higher incomes, and better mental health. However, on the basis of the skin-deep-resilience findings described above, we also anticipated that these successes might take a toll on physical health. That is, we hypothesized that there would be an interaction between disproportionate school punishment and academic orientation in terms of physical health; specifically, for Black students in our sample attending schools that disproportionately punished their Black students, high academic orientation in adolescence would predict poorer physical health in adulthood because of the stress of having to endure a discriminatory school environment while remaining engaged in school.

In this study, health was operationalized in terms of insulin resistance. As cells become desensitized to insulin's effects, their capacity to absorb glucose declines, which triggers the liver to produce excess glucose. Both processes cause glucose to accumulate in the bloodstream, which over time contributes to numerous health problems, including diabetes, metabolic syndrome, and heart disease, along with cognitive decline. Thus insulin resistance is considered a useful biomarker of early cardiometabolic disease and other chronic health problems in young adults (Wilkin, 2009).

Method

Participants

Data for this study were drawn from the Strong African American Families Healthy Adults Project (SHAPE; Brody et al., 2013). Starting in 2001, SHAPE enrolled 667 Black children in fifth grade (mean age = 11.2 years, $SD = 0.3$) along with primary caregivers (preregistration was not common at that time, so the SHAPE study was not preregistered). Families resided in rural counties in Georgia, where poverty rates were among the highest in the nation. Economically, these households could be characterized as "working poor." Primary caregivers had a median household income of $1,612 per month; 42.3% lived below the federal poverty thresholds. In 2009 to 2010, when participants were 19 years old, 500 were randomly selected, because of funding constraints, to participate in a collection of biological data. Equivalence analyses indicated that the random subsample did not differ from the original sample in family socioeconomic status (SES) or early adolescence self-control. In 2017, when participants were 27 years old, we conducted blood draws on 388 of the 500 participants, from which insulin resistance was measured. In 2019, 307 of the 500 provided information about their high school (necessary for accessing school discipline rates). Thus, the sample for the present study consisted of 261 participants (91 men, 170 women) from whom blood was obtained at age 27 and for whom high school data were available. Power analyses revealed that a sample size of 261 would give a power of .80 to detect an interaction effect size of .03 for an R^2 change. Compared with the original study cohort, the analytic sample had a higher percentage of female participants (65.1% vs. 52.8%), higher externalizing problems at age 18 ($M = 5.48$ vs. 4.97), and higher body mass index (BMI) at age 19 ($M = 28.77$ vs. 27.67), $ps < .05$; the samples were similar on all other demographic and study variables.

Procedure

Data were collected in participants' homes. Early adolescent assessments of demographic variables and self-control were obtained at ages 11 to 13 years from 2001 to 2004. Late-adolescent assessments of academic orientation, mental health, and physical health were obtained from ages 18 to 21 (from 2008 to 2012). Adult outcomes were assessed at age 27 (2016–2017). At age 29, participants were queried about the high school

they had attended in order to obtain school discipline rates. Informed consent was obtained at all time points. The University of Georgia's Institutional Review Board reviewed and approved all study procedures.

Measures

Early adolescence self-control. When youths were 11, 12, and 13 years of age, one of each of their teachers completed a self-control questionnaire about each youth at each wave. Self-control was assessed using the 12-item Self-Control Inventory (Humphrey, 1982), on which higher scores indicate higher self-control. Teacher ratings were averaged across the three time points.

Disproportionate school punishment. School punishment data were obtained from the Civil Rights Data Collection (https://ocrdata.ed.gov). This collection includes biannual surveys of public schools in the United States, administered by the U.S. Department of Education's Office for Civil Rights. The surveys focus on academic programming, teaching and financial resources, and disciplinary practices. Results can be stratified by multiple student demographic characteristics.

For the present analysis, we recorded counts of the following disciplinary practices for each participant's high school: corporal punishment, in-school and out-of-school suspensions, expulsions with or without educational services, expulsions under zero-tolerance policies, referrals to law enforcement, and school-related arrests. We used the survey results closest in time to each student's high school graduation. (Thus, results are predominately based on survey data from 2009 but in a handful of cases from 2011 or 2013.) The disproportionate-punishment variable was calculated using the following steps. First, a total punishment count for Black and White students was calculated by summing all punishment instances within each racial group at each high school. Second, the total punishment count was divided by the enrollment number for Black and White students at each high school to form a ratio score for each race. Third, a disproportionate-school-punishment score was calculated as the ratio score for Black students minus the ratio score for White students. Higher positive scores indicate schools in which Black students are disproportionately punished relative to White students. Participants came from 20 schools (1–61 participants at each school). The disproportionate-punishment variable ranged from −0.03 to 1.00 (M = 0.23, SD = 0.11).

Late-adolescence academic orientation. When participants were 19, 20, and 21 years old, academic orientation was assessed using the 20-item Academic Orientation Questionnaire (Conger, 1989); higher scores on this measure indicate higher academic orientation. Academic-orientation scores were averaged across the three assessments.

Adult outcomes (age 27).

Educational attainment. Educational attainment was measured on an 11-point scale ranging from 1 (*Grade 9 or below*) to 11 (*Doctorate or professional degree*).

Personal income. Participants reported their average monthly gross personal income.

Depressive symptoms. Self-reports of depressive symptoms were obtained using the Center for Epidemiologic Studies Depression (CES-D) scale (Radloff, 1977). Participants rated 20 symptoms on a scale ranging from 0 to 3.

Externalizing behavior. Externalizing symptoms were measured using the Adult Self-Report (ASR; Achenbach & Rescorla, 2003). The Aggressive, Intrusive, and Rule Breaking subscales were used to index externalizing symptoms.

Insulin resistance. An overnight fasting blood sample was drawn into serum-separator tubes (Becton, Dickinson, Franklin Lakes, NJ). Specimens were centrifuged, and serum was harvested and stored at −80° C. Serum glucose was measured photometrically using an ultraviolet test on a cobas c502 analyzer (Roche Diagnostics, Indianapolis, IN). Intra-assay coefficient of variation was 0.7%. Serum insulin was assayed in duplicate using a multiplex electrochemiluminescent immunoassay (Human Leptin/Insulin Kit K15164C; Meso Scale Discovery, Rockville, MD) on a SECTOR Imager 2400A (Meso Scale Discovery). Intra-assay coefficient of variation averaged 3.8%. Insulin resistance was estimated according to the original homeostasis-assessment model, HOMA-IR (Matthews et al., 1985), calculated as ([fasting glucose(mmol/L) × fasting insulin(mIU/L)]/22.5). Insulin-resistance values were log transformed because of their skewed distribution.

Covariates

The process for choosing covariates was as follows. Age and race were not included because all youths were Black and were in the same grade when they entered the study. Sex, SES disadvantage, and intervention status were included as part of a standard set of variables that our group typically includes as covariates (unless SES is a variable of interest; Brody et al., 2013; Chen et al., 2018; Miller et al., 2015). Sex was dummy coded (male = 1, female = 0). SES disadvantage was measured at ages 11 to 13 using six indicators: current family poverty, primary caregiver's noncompletion of

high school or equivalent, primary caregiver's current unemployment, single-parent family structure, current receipt of Temporary Assistance for Needy Families benefits, and income rated by the caregiver as inadequate to meet all needs. These six indicators were scored yes or no in the same way as in our previous studies (e.g., Brody et al., 2013). The average number of indicators endorsed across ages 11 to 13 was calculated. Additionally, the SHAPE cohort was initially recruited for a randomized controlled trial of a family intervention. Participation in the intervention was not associated with any outcomes at age 27. Nonetheless, we included a covariate reflecting intervention arm (treatment vs. control) in all models.

During the review process, reviewers recommended adding several covariates at the school and neighborhood levels. At the school level, the percentage of Black students enrolled in each high school and the percentage of students who qualified for free or reduced-price lunch in each high school were included as covariates. At the neighborhood level, the percentage of households living below the federal poverty threshold (based on census data using participants' family address at ages 16–18) was included as a covariate.

In addition, given the longitudinal nature of this study, an a priori decision was made that for all mental and physical health outcomes, we would include the same or similar variables measured at an earlier time point in order to have a baseline measure of health controlled. For mental health, both the CES-D and ASR were administered for the first time at age 18, and hence responses from this time point were used as covariates in analyses predicting mental health outcomes at age 27.

For physical health, we did not have insulin resistance measured at an earlier age. However, at age 19, we assessed BMI and blood pressure, both of which are predictors of insulin resistance (Choi et al., 2019; Kahn & Flier, 2000; Ye, 2013). Although there are limitations to using BMI as an indicator of obesity and as a predictor of clinical risk (Emerging Risk Factors Collaboration, 2011; Rothman, 2008), BMI and blood pressure were the best available physical health proxies we had at age 19 in this sample and thus were included as covariates in analyses predicting insulin resistance at age 27. For BMI, researchers measured weight using a standard home scale and height using a tape measure. Resting blood pressure was monitored with a Critikon Dinamap Pro 100 (Critikon, Tampa, FL) while the participant sat reading quietly. Three readings were taken every 2 min, and the average of the last two readings was used.

Last, because we did not have insulin resistance measured at an earlier age, we decided a priori to include as stringent a set of covariates as possible by also controlling for health behaviors at age 19. Health behaviors are strong predictors of cardiometabolic diseases and mortality, and the most commonly assessed behaviors are substance use, physical activity, and diet (Petrovic et al., 2018; Stringhini et al., 2010). Substance use at age 19 was assessed using items from the Monitoring the Future study (Johnston et al., 2007), including cigarette, alcohol, and marijuana use over the past month, as well as binge drinking. Responses were summed to form a substance-use composite. At age 19, participants also reported their diet habits and physical activity in the past week on the Adult Health Behavior Questionnaire (Youth Risk Behavior Surveillance System, 2009). Higher scores represented less healthy diets or a lack of physical activity.

Statistical analyses

Linear regression models were conducted to test the study hypotheses. The first model tested whether disproportionate school punishment interacted with early adolescent self-control to predict academic orientation at ages 19 to 21. This model estimated the main effects of self-control and disproportionate school punishment and the interaction of the two in forecasting later academic orientation. All interaction analyses were conducted according to established guidelines (Aiken & West, 1991), whereby variables are first mean centered and interactions are calculated as the product of the centered variables. The covariates of gender, family SES, the percentage of Black students in participants' high schools, the percentage of students who qualified for free or reduced-price lunch in participants' high schools, the percentage of households in participants' neighborhoods that were below the poverty threshold, and intervention status were included. In all analyses, the Type=COMPLEX command of Mplus (Version 8.2; Muthén & Muthén, 2018) was used to account for the nonindependence of observations among participants from the same school.

Next, we conducted linear regression analyses to examine whether disproportionate school punishment interacted with academic orientation to predict life outcomes at age 27, paralleling the above analyses. For the outcomes of educational attainment and personal income, the same covariates as above were used. For the outcome of insulin resistance, earlier health measures of blood pressure at age 19 (systolic and diastolic blood pressure, standardized and summed), BMI at age 19, and health behaviors at age 19 were included as additional covariates. For the outcomes of depressive symptoms and externalizing problems, earlier mental health measures at age 18 were included as additional covariates.

Where significant interactions emerged, the conditional indirect effects (moderated mediation) were

estimated to determine whether academic orientation at ages 19 to 21 would mediate the association between self-control at ages 11 to 13 and life outcomes at age 27, particularly when participants attended schools that disproportionately punished Black students. This hypothesis was tested using regression-based conditional-indirect-effect analysis procedures (Hayes, 2018). Regression coefficients were calculated for the association between self-control and academic orientation for youths who experienced low (simple slope a_1) and high (simple slope a_2) levels of disproportionate school punishment. Next, regression coefficients were calculated for the association between academic orientation and outcomes at age 27 for participants who experienced low (simple slope b_1) and high (simple slope b_2) levels of disproportionate school punishment. Finally, the conditional indirect effect was quantified as the product of the two regression coefficients ($a_1 \times b_1$ for youths who attended schools with relatively equal school punishments; $a_2 \times b_2$ for high disproportionate school punishment). All analyses were conducted using Mplus (Version 8.2; Muthén & Muthén, 2018).

Results

Bivariate correlations and descriptive statistics are presented in Table 1.

Disproportionate school punishment, self-control, and academic orientation

The first model tested the hypothesized interaction between disproportionate school punishment and early adolescent self-control as a predictor of late-adolescent academic orientation (see Table 2). The positive main effect of self-control on academic orientation was qualified by a significant interaction with disproportionate school punishment, $b = 0.756$, 95% confidence interval (CI) = [0.244, 1.267], $p = .004$, $\beta = 0.108$, 95% CI = [0.005, 0.211]. To interpret this finding, we plotted estimated levels of academic orientation at low (1.5 *SD* below the mean) and high (1.5 *SD* above the mean) levels of self-control and school punishment. We then performed simple-slopes analyses, estimating the association between self-control and academic orientation at different levels of disproportionate school punishment. Figure 1 presents these results. When participants from our sample attended schools in which Black students were disproportionately punished, having high self-control in early adolescence predicted greater academic orientation during late adolescence (simple slope: $b = 0.333$, 95% CI = [0.191, 0.475], $\beta = 0.365$, $p < .001$). In contrast, when participants attended schools in which punishment rates were relatively equal by race, self-control was not associated with later academic orientation (simple slope: $b = 0.091$, 95% CI = [–0.086, 0.269], $\beta = 0.041$, $p = .314$).

Disproportionate school punishment, academic orientation, and adult life outcomes

Educational attainment. The second set of models tested the hypothesized interaction between disproportionate school punishment and academic orientation in later adolescence as a predictor of educational attainment in adulthood. The positive main effect of academic orientation on adult educational attainment was qualified by a significant interaction with disproportionate school punishment, $b = 0.163$, 95% CI = [0.011, 0.315], $p = .036$, $\beta = 0.114$, 95% CI = [0.001, 0.232]. Simple slopes were computed at low (–1.5 *SD*) and high (+1.5 *SD*) levels of disproportionate school punishment. When our participants from the rural South attended schools in which Black students were disproportionately punished, maintaining high academic orientation in adolescence was associated with higher educational attainment by age 27 (simple slope: $b = 0.060$, 95% CI = [0.027, 0.094], $\beta = 0.371$, $p < .001$). Associations were not significant when Black students from our sample attended schools in which punishment rates were relatively equal across races (simple slope: $b = 0.008$, 95% CI = [–0.010, 0.026], $\beta = 0.029$, $p = .371$; see Table 3).

Personal income. The positive main effect of academic orientation on adult income was also qualified by a significant interaction with disproportionate school punishment, $b = 74.405$, 95% CI = [40.135, 108.674], $p < .001$, $\beta = 0.089$, 95% CI = [0.032, 0.145]. Simple-slopes analyses revealed that when our participants attended a high school that disproportionately punished Black students, maintaining high levels of academic orientation predicted earning a higher income at age 27 (simple slope: $b = 30.623$, 95% CI = [22.143, 39.104], $\beta = 0.320$, $p < .001$). Associations for students who attended schools with relatively equal punishment rates were not significant (simple slope: $b = 6.814$, 95% CI = [–2.608, 16.236], $\beta = 0.053$, $p = .156$; see Table 3).

Mental health. The next set of models tested effects with respect to adult mental health outcomes. These models did not reveal significant interactions between academic orientation and disproportionate school punishment. Rather, there were significant main effects of both predictors on depressive symptoms: Models controlling for depression at age 18 revealed that high

academic orientation in late adolescence predicted fewer depressive symptoms at age 27, $b = -0.197$, 95% CI = [−0.310, −0.084], $p = .001$, $\beta = -0.185$, 95% CI = [−0.289, −0.080]. Attending a high school that disproportionately punished Black students predicted more depressive symptoms at age 27, $b = 10.066$, 95% CI = [4.997, 15.135], $p < .001$, $\beta = 0.109$, 95% CI = [0.043, 0.176]. In addition, models controlling for externalizing problems at age 18 revealed that high academic orientation in late adolescence predicted fewer externalizing problems at age 27, $b = -0.170$, 95% CI = [−0.264, −0.077], $p < .001$, $\beta = -0.224$, 95% CI = [−0.334, −0.114] (see Table 4).

Insulin resistance. The next model tested interaction effects with respect to the physical health outcome of insulin resistance. A significant interaction of academic orientation and disproportionate school punishment emerged, $b = 0.039$, 95% CI = [0.006, 0.072], $p = .020$, $\beta = 0.121$, 95% CI = [0.005, 0.237] (see Fig. 2). Simple-slopes analyses revealed that when youths attended a high school that disproportionately punished Black students, high levels of academic orientation in late adolescence predicted higher insulin resistance at age 27 (simple slope: $b = 0.009$, 95% CI = [0.001, 0.017], $\beta = 0.244$, $p = .036$). In contrast, if youths from our sample attended schools with relatively equal punishment rates, academic orientation was not associated with adult insulin resistance (simple slope: $b = -0.004$, 95% CI = [−0.012, 0.004], $\beta = -0.120$, $p = .358$).

The above findings for insulin resistance at age 27 held when we included our standard set of demographic covariates, $p = .027$, as well as when we added earlier health measures as covariates: blood pressure at age 19 and health behaviors at age 19, $p = .020$ (see Table 5 for full model details). We then ran a third model that included demographics, blood pressure at age 19, health behavior at age 19, and BMI at age 19 as covariates. We conducted this as a distinct set of analyses, given the strong evidence that obesity is an antecedent of insulin resistance (Kahn & Flier, 2000; Ye, 2013). With this additional variable in the model, the interaction term became nonsignificant ($p = .115$; see Table 5), suggesting that obesity may serve as part of the pathway from self-control and academic orientation to insulin resistance.

Moderated mediation

Finally, where we observed the significant interactions described above, we tested moderated mediation by calculating the conditional indirect effects of self-control on insulin resistance via academic orientation for low versus high levels of disproportionate school punishment. A significant indirect effect linking self-control at ages 11 to 13 to insulin resistance at age 27 via academic orientation at ages 19 to 21 emerged, but only among participants who attended schools that disproportionately punished Black students (indirect effect: $b = 0.333 \times 0.009 = 0.003$, 95% CI = [0.001, 0.005]). No significant indirect effects emerged for participants who attended schools with relatively equal punishment rates (indirect effect: $b = 0.091 \times -0.004 = 0.000$, 95% CI = [−0.001, 0.001]).

When we tested the conditional indirect effects of self-control on educational attainment and personal income through academic orientation, we also found significant indirect effects linking early adolescent self-control via late-adolescent academic orientation to educational attainment at age 27 (indirect effect: $b = 0.333 \times 0.060 = 0.020$, 95% CI = [0.003, 0.037]) and to personal income at age 27 (indirect effect: $b = 0.333 \times 30.623 = 10.199$, 95% CI = [4.209, 16.189]). However, these effects were found only for youths who attended schools that disproportionately punished Black students. Indirect effects were not significant for participants who attended schools with relatively equal punishment rates.

Discussion

This 18-year longitudinal study of Black youths from rural Georgia suggests that there are benefits of high self-control for adult life outcomes—other than physical health—when students have to navigate a school environment that disproportionately punishes its Black students. Specifically, the present study revealed that the Black youths in our sample with high self-control in early adolescence had higher academic orientation in later adolescence, which in turn predicted higher educational attainment, higher income, and better mental health in adulthood. These patterns emerged in school settings in which Black students were disproportionately punished relative to White students. When the Black youths in our sample attended schools with more equal punishment rates, self-control and academic orientation were less important contributors to adult outcomes.

Second, the present study revealed a divergence between physical health and other life outcomes. Here, higher academic orientation in adolescence predicted worse insulin resistance in adulthood, specifically for Black students who attended schools that disproportionately punished Black students. This pattern was not evident in the Black students who disengaged from school, as reflected in low academic orientation. These findings parallel previous results, which show that academic success and physical health diverge in low-SES Black youths. This apparent trade-off is not found in

Table 1. Descriptive Statistics for and Correlations Among Study Variables

Variable	Mean or *n*	Correlations						
		1	2	3	4	5	6	7
1. Gender (male)	*n* = 91 (34.9%)	—						
2. Intervention status	*n* = 144 (55.2%)	.029	—					
3. SES disadvantage (ages 11–13)	*M* = 2.347 (*SD* = 1.297)	−.032	.120	—				
4. Self-control (ages 11–13)	*M* = 28.678 (*SD* = 8.812)	−.250***	−.006	−.117	—			
5. Depressive symptoms (age 18)	*M* = 11.542 (*SD* = 8.514)	−.032	.076	.094	−.128*	—		
6. Externalizing problems (age 18)	*M* = 5.477 (*SD* = 4.881)	−.041	.027	.015	−.211**	.441***	—	
7. Percentage of Black students (high school)	*M* = 0.629 (*SD* = 0.146)	.075	−.024	.081	−.028	−.022	−.043	—
8. Percentage receiving free lunch (high school)	*M* = 0.629 (*SD* = 0.256)	.085	.438***	.193**	−.104	−.009	−.028	.558***
9. Neighborhood poverty (ages 16–18)	*M* = 0.230 (*SD* = 0.077)	−.006	.080	.264***	−.094	−.013	.012	.328***
10. Disproportionate school punishment (high school)	*M* = 0.233 (*SD* = 0.107)	.099	.216***	−.074	.054	−.040	.052	.227***
11. Body mass index (age 19)	*M* = 28.770 (*SD* = 8.619)	−.136*	−.016	.138*	.027	−.060	.012	.011
12. Blood pressure (age 19)	*M* = 0 (*SD* = 1.805)	.176**	−.087	.018	−.046	−.141*	−.001	.075
13. Lack of physical activity (age 19)	*M* = 0.209 (*SD* = 1.799)	.056	−.048	−.111	.083	−.071	.019	.012
14. Unhealthy diet (age 19)	*M* = 0.173 (*SD* = 2.488)	−.012	−.095	−.013	−.013	−.111	−.077	−.067
15. Substance use (age 19)	*M* = 0.262 (*SD* = 0.301)	.161**	−.003	−.093	−.220***	.055	.248***	−.103
16. Academic orientation (ages 19–21)	*M* = 81.356 (*SD* = 9.278)	−.254***	−.056	.087	.229***	−.237***	−.363***	.119
17. Insulin resistance (HOMA; age 27)	*M* = 1.285 (*SD* = 0.360)	−.273***	−.005	.087	.086	−.113	.003	−.069
18. Educational attainment (age 27)	*M* = 5.667 (*SD* = 1.586)	−.217***	−.092	−.234***	.309***	−.148*	−.129*	.069
19. Personal income (age 27)	*M* = 1,380.931 (*SD* = 933.803)	.074	−.004	−.300***	.140*	−.084	−.120	.100
20. Depressive symptoms (age 27)	*M* = 13.502 (*SD* = 9.934)	−.129*	.045	.114	−.122*	.463***	.336***	−.091
21. Externalizing problems (age 27)	*M* = 6.207 (*SD* = 7.253)	.063	−.004	−.025	−.155*	.178**	.429***	−.050

Table 1. *(continued on next page)*

Table 1. *(continued)*

8	9	10	11	12	13	14	15	16	17	18	19	20
—												
.286***	—											
.142*	−.189**	—										
.021	.142*	−.049	—									
−.028	.148*	−.036	.353***	—								
−.156*	−.070	.124*	−.037	.031	—							
−.064	−.040	.028	−.080	−.069	.083	—						
−.040	−.018	.032	−.047	.065	−.024	.054	—					
.094	.093	−.068	.084	.030	−.077	−.086	−.216***	—				
.023	.039	−.022	.453***	.164**	.001	−.140*	−.124*	.160**	—			
−.039	−.142*	.055	.077	−.026	.117	.118	−.096	.225***	.098	—		
.014	−.114	.072	−.092	.117	−.038	.061	−.078	.134*	−.056	.263***	—	
−.057	−.014	.050	.010	−.103	.043	−.012	.139*	−.244***	−.019	−.107	−.259***	—
.017	−.039	.048	.057	.042	.026	.058	.236***	−.347***	.020	−.019	−.134*	.425***

Note: Socioeconomic status (SES) disadvantage was coded on the basis of the number of difficulties endorsed; thus, higher values indicate greater disadvantage, or lower SES. Homeostatic Model Assessment (HOMA) was used to assess insulin resistance. Mean blood pressure reflects systolic and diastolic blood pressure after being standardized and then averaged.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 2. Self-Control at Ages 11 to 13 Years and Disproportionate School Punishment During High School as Predictors of Academic Orientation at Ages 19 to 21 ($N = 261$)

	Academic orientation (ages 19–21)	
Predictor	*b*	95% CI
Gender (male)	−3.988**	[−6.909, −1.066]
SES disadvantage (ages 11–13)	0.566	[−0.208, 1.339]
Intervention status	−1.839	[−3.816, 0.138]
Percentage of Black students (high school)	3.607	[−1.898, 9.112]
Percentage receiving free lunch (high school)	4.051	[−0.324, 8.427]
Neighborhood poverty (ages 16–18)	6.144	[−10.182, 22.470]
Self-control (ages 11–13)	0.212**	[0.074, 0.350]
Disproportionate school punishment	−0.668	[−9.376, 8.041]
School Punishment × Self-Control	0.756**	[0.244, 1.267]

Note: SES = socioeconomic status; CI = confidence interval.
**$p < .01$.

low-SES, low-striving Black youths or in White youths (Brody et al., 2016; Gaydosh et al., 2018; Miller et al., 2015). This pattern is also consistent with the findings reported in the large literature on the physical health costs of discrimination (Lewis et al., 2015; Pascoe & Smart Richman, 2009; Williams & Mohammed, 2009).

What are the psychological mechanisms that might explain these physical health patterns? In a theoretical article (Chen et al., in press), we postulated that for low-income youths of color who are seeking upward mobility through educational attainment, physical health costs are more likely to arise because of the

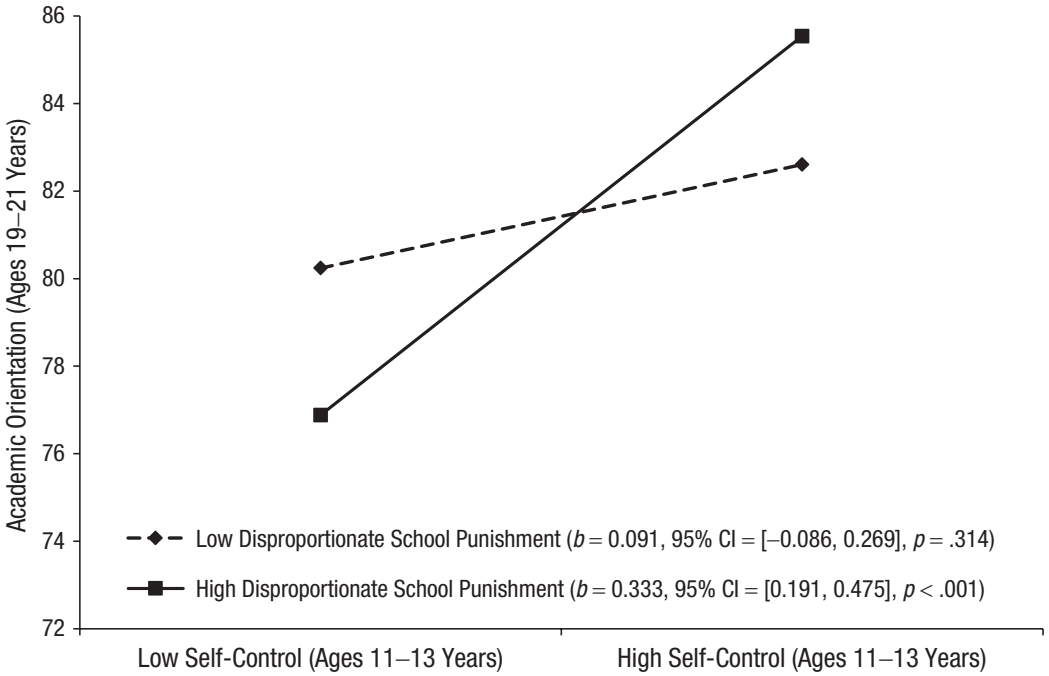

Fig. 1. Effect of early-adolescence self-control on late-adolescence academic orientation by levels of disproportionate school punishment. Statistics refer to simple slopes for 1.5 standard deviations below the mean (corresponding to high schools with relatively equal punishment rates across races) and 1.5 standard deviations above the mean (corresponding to high schools that disproportionately punish Black students). CI = confidence interval.

Table 3. Academic Orientation at Ages 19 to 21 Years and Disproportionate School Punishment During High School as Predictors of Educational Attainment and Personal Income at Age 27 ($N = 261$)

	Educational attainment (age 27)		Personal income (age 27)	
Predictor	*b*	95% CI	*b*	95% CI
Gender (male)	−0.571*	[−1.007, −0.134]	215.599	[−40.018, 471.216]
SES disadvantage (ages 11–13)	−0.255***	[−0.350, −0.159]	−208.521**	[−328.907, −88.135]
Intervention status	−0.076	[−0.421, 0.269]	147.843**	[60.266, 235.419]
Percentage of Black students (high school)	1.424**	[0.436, 2.411]	1,021.295***	[459.326, 1,583.265]
Percentage receiving free lunch (high school)	−0.160	[−0.800, 0.480]	−169.309	[−390.077, 51.460]
Neighborhood poverty (ages 16–18)	−2.396	[−4.858, 0.067]	−1,055.801	[−2,563.593, 451.990]
Disproportionate school punishment	0.785	[−1.466, 3.035]	76.870	[−349.225, 502.965]
Academic orientation (ages 19–21)	0.034***	[0.023, 0.046]	18.719***	[11.627, 25.810]
School Punishment × Academic Orientation	0.163*	[0.011, 0.315]	74.405***	[40.135, 108.674]

Note: SES = socioeconomic status; CI = confidence interval.
*$p < .05$. **$p < .01$. ***$p < .001$.

amount and years of constant effort and hard work that these youths have to put in in order to succeed. Further, they often have fewer resources and less support than middle- or upper-class students and have to balance numerous competing life demands, all while trying to cope with discriminatory environments and/or stereotypes about expected behaviors for Black students that often create barriers to success and feelings of isolation and alienation in academic settings. These psychological mechanisms activate stress-responsive physiological systems that over time can lead to long-term alterations in physiological functioning that have implications for chronic diseases. In addition, they lead to engagement in unhealthy behaviors as a way to cope with uncontrollable stressors and create constraints on individuals' time for engaging in restorative health behaviors (Chen et al., in press). Multiple previous studies have documented empirical support for individual-level psychological mechanisms (e.g., striving and related constructs, such as John Henryism) in support of this model (Brody et al., 2016; James et al., 1987, 1992; Miller et al., 2015). Other individual-level factors may also explain the health costs seen here, for example, the level of vigilance one must adopt as a person of color witnessing other students of color being punished more frequently; anger suppression as a coping mechanism for confronting discriminatory environments; or the notion of side effects, such as increased threat perception, anger, and frustration, that may emerge when one acknowledges the realities of discriminatory environments (APA Working Group on Stress and Health Disparities, 2017; Brondolo et al., 2009). The present

Table 4. Academic Orientation at Ages 19 to 21 Years and Disproportionate School Punishment During High School as Predictors of Depressive Symptoms and Externalizing Problems at Age 27 ($N = 261$)

	Depressive symptoms (age 27)		Externalizing problems (age 27)	
Predictor	*b*	95% CI	*b*	95% CI
Gender (male)	−3.395***	[−4.693, −2.097]	0.266	[−1.825, 2.358]
SES disadvantage (ages 11–13)	0.722*	[0.042, 1.403]	−0.065	[−0.868, 0.739]
Intervention status	−0.672	[−2.295, 0.952]	−1.351	[−3.233, 0.531]
Percentage of Black students (high school)	−6.477**	[−10.296, −2.659]	−4.503*	[−8.720, −0.287]
Percentage receiving free lunch (high school)	0.018	[−2.954, 2.991]	3.958	[−0.180, 8.095]
Neighborhood poverty (ages 16–18)	4.470	[−6.148, 15.088]	−1.542	[−13.540, 10.456]
Depressive symptoms (age 18)	0.478***	[0.328, 0.628]	—	—
Externalizing problems (age 18)	—	—	0.521***	[0.253, 0.789]
Disproportionate school punishment	10.066***	[4.997, 15.135]	2.128	[−6.784, 11.039]
Academic orientation (ages 19–21)	−0.197**	[−0.310, −0.084]	−0.170***	[−0.264, −0.077]
School Punishment × Academic Orientation	−0.135	[−0.482, 0.211]	0.036	[−0.931, 1.003]

Note: SES = socioeconomic status; CI = confidence interval.
*$p < .05$. **$p < .01$. ***$p < .001$.

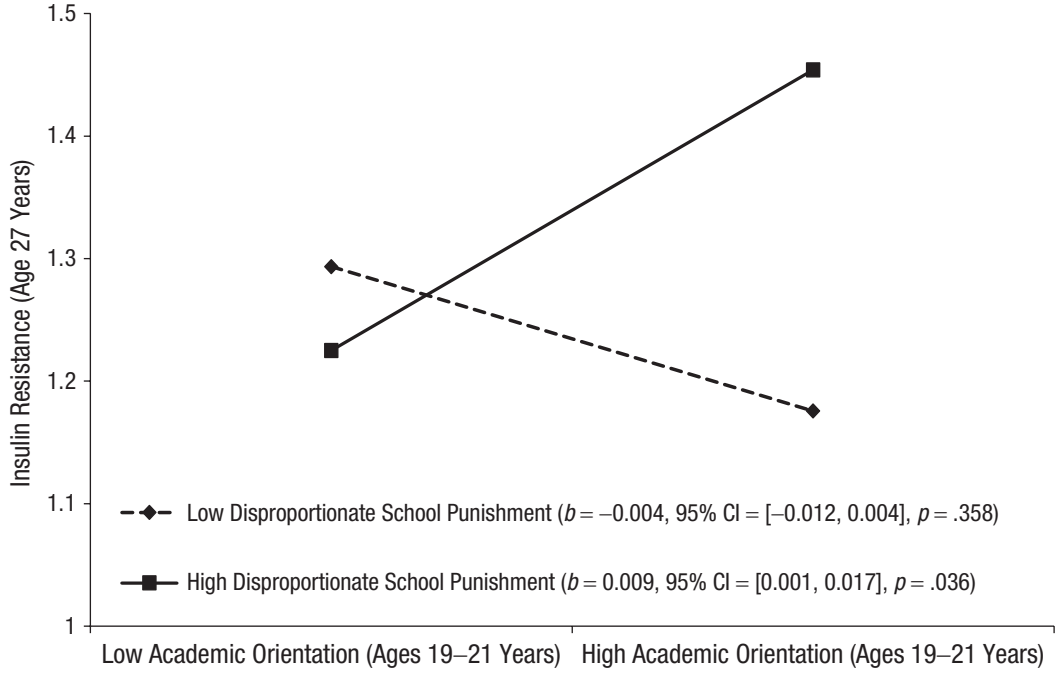

Fig. 2. Effect of late-adolescence academic orientation on adult insulin resistance by levels of disproportionate school punishment. Statistics refer to simple slopes for 1.5 standard deviations below the mean (corresponding to high schools with relatively equal punishment rates across races) and 1.5 standard deviations above the mean (corresponding to high schools that disproportionately punish Black students). CI = confidence interval.

study extends this previous research by broadening the consideration of contributing factors from the individual level to structural or environmental causes—that is, how school-level factors can play a role in potentially contributing to the health profiles of youths of color who are striving for academic success.

Although not directly related to our study hypotheses, our findings also suggested that when the Black

Table 5. Academic Orientation at Ages 19 to 21 Years and Disproportionate School Punishment During High School as Predictors of Insulin Resistance at Age 27 ($N = 261$)

	Insulin resistance (age 27)					
Predictor	*b*	95% CI	*b*	95% CI	*b*	95% CI
Gender (male)	–0.177***	[–0.261, –0.092]	–0.208***	[–0.282, –0.134]	–0.150***	[–0.233, –0.067]
SES disadvantage (ages 11–13)	0.021	[–0.007, 0.050]	0.021	[–0.008, 0.049]	0.009	[–0.025, 0.043]
Intervention status	–0.049	[–0.131, 0.033]	–0.058	[–0.124, 0.008]	–0.032	[–0.097, 0.033]
Percentage of Black students (high school)	–0.407*	[–0.714, –0.099]	–0.517**	[–0.843, –0.191]	-0.363**	[–0.585, –0.140]
Percentage receiving free lunch (high school)	0.175*	[0.012, 0.339]	0.239**	[0.074, 0.403]	0.174*	[0.039, 0.309]
Neighborhood poverty (ages 16–18)	0.303	[–0.184, 0.790]	0.172	[–0.265, 0.609]	–0.024	[–0.434, 0.386]
Disproportionate school punishment	0.301	[–0.103, 0.706]	0.328	[–0.038, 0.694]	0.199	[–0.147, 0.544]
Academic orientation (ages 19–21)	0.004	[–0.002, 0.010]	0.002	[–.004, 0.009]	0.002	[–0.002, 0.007]
School Punishment × Academic Orientation	0.042*	[0.005, 0.080]	0.039*	[0.006, 0.072]	0.025	[–0.006, 0.056]
Blood pressure (age 19)	—	—	0.045***	[0.033, 0.057]	0.016**	[0.006, 0.025]
Lack of physical activity (age 19)	—	—	0.008	[–0.015, 0.032]	0.007	[–0.011, 0.024]
Unhealthy diet (age 19)	—	—	–0.017	[–0.035, 0.001]	–0.014	[–0.031, 0.004]
Substance use (age 19)	—	—	–0.042	[–0.104, 0.019]	–0.032	[–0.090, 0.027]
Body mass index (age 19)	—	—	—	—	0.016***	[0.012, 0.019]

Note: SES = socioeconomic status; CI = confidence interval.
*$p < .05$. **$p < .01$. ***$p < .001$.

students from our sample attended high schools with a higher percentage of Black students, they had better life outcomes, including lower levels of depressive symptoms, fewer externalizing problems, higher educational attainment and income, and less insulin resistance in adulthood. This suggests the possibility that having a critical mass of Black students may help contribute to a sense of belonging and feeling more accepted and welcomed in the school environment, which might in turn help facilitate youths achieving positive life outcomes without having to incur physical health costs. It may also be the case that schools with a higher percentage of Black students also have a higher percentage of Black teachers: Previous evidence has demonstrated that Black teachers can often serve as role models and are associated with Black students achieving higher test scores and enrolling in more rigorous classes (Bristol & Martin-Fernandez, 2019; Walker, 1996, 2000).

It is important to note that we are not suggesting that this study implies that it is the responsibility of Black youths to cultivate self-control and high academic orientation in order to achieve success in life. Rather, there is work that needs to be done to change the existing systems that perpetuate racial inequities (Reskin, 2012). Nonetheless, psychologists can be instrumental in identifying characteristics that help individuals to be resilient in the face of such adversities. It is in this spirit that we present these findings, which suggest that in school environments that are discriminatory, Black students who find ways to nonetheless maintain high self-control and academic orientation may be able to overcome the odds stacked against them. These psychological factors may potentially help to contribute to positive life outcomes in adulthood; however, it appears that there may at the same time be a physical cost associated with achieving these successes.

One major limitation to keep in mind when interpreting the results of this study is that our disproportionate-school-punishment variable was limited to what was available from the Department of Education's Office for Civil Rights. Thus, we had information about punishment rates by race but no data on student infractions or behaviors. This raises the question of how certain we can be that disproportionate school punishment is reflective of a discriminatory school environment or systemic injustices in the school setting, as opposed to differences by race in misbehavior (that then lead to differences in punishment). Much literature has been devoted to this topic, and there are numerous studies documenting, for example, that Black students are more likely to receive office referrals or suspensions even after researchers control for student behavior (Finn & Servoss, 2014; Rocque, 2010), that Black students are less likely to receive warnings for similar behaviors than White students (suggesting that teachers are more likely to move straight to punishment with Black students; Wegmann & Smith, 2019), and that the race differences in problematic behaviors are much smaller than the race differences in school suspension rates (Wallace et al., 2008). Furthermore, even if we had data on student behaviors, these would also come with their own interpretive issues, as it is possible that some teachers might be more likely to perceive or label Black students' behaviors as problematic, meaning that biases could also emerge at the level of behavior and not just punishment. In addition, when Black students witness other Black students being punished more frequently than White students, they might be more likely to perceive an unfair system (regardless of whether the origins lie in differential infractions or not). Nonetheless, we acknowledge that our data must be interpreted with caution, given that they are based on proxy variables that are suggestive of, but not definitive proof for, biases in how Black students are treated in some school environments.

Other limitations of this study include the lack of other racial or ethnic groups and the rural, Southern composition of the sample, both of which limit generalizability. Although this study and some other studies on skin-deep resilience were conducted on Black youths from rural Georgia (Brody et al., 2013; Miller et al., 2015), other studies on skin-deep resilience have examined national samples and replicated the same patterns (Brody et al., 2016; Gaydosh et al., 2018; Miller et al., 2020), thus providing support for the notion that these effects apply more broadly than to just rural areas in the South. Nonetheless, these findings reflect a specific racial and educational context within the United States and may not be applicable to populations outside the United States. We also note that this study focused on depressive symptoms and insulin resistance, neither of which represents a clinical outcome. Future studies are needed to determine whether the trends observed here result in differential morbidity and/or mortality. In addition, this study was observational, which precludes conclusions about causality. Future studies addressing this topic should consider experimental manipulations or interventions to change self-control or academic orientation. A large literature exists on both self-control interventions (Berkman et al., 2012; Friese et al., 2017) and interventions to increase students' academic motivation and engagement in school (Harackiewicz & Priniski, 2018; Oyserman, 2015). Given the present study's findings, future iterations of these interventions may need to incorporate a more holistic understanding of student well-being and add intervention components that promote physical health at the same time as they

encourage academic achievement (Chen et al., 2021). In addition, it is important to acknowledge that interventions should not be conducted solely at the individual level but are also needed at the school level, to change the climate in school settings and to alter teacher-student interaction patterns that contribute to school inequalities (Browman & Destin, 2016; Okonofua et al., 2016; Stephens et al., 2012).

In sum, this study demonstrated that when Black students from rural Georgia attended schools that disproportionately punish Black students, those with high self-control in early adolescence evinced higher academic orientation later in adolescence, which in turn predicted higher educational attainment, higher income, and better mental health in adulthood. However, the results also suggest that these life successes may come at a cost, as Black students from these same schools who had high self-control and academic orientation had higher insulin resistance in adulthood. As our society grapples with centuries of racial inequalities across multiple domains, it is important to understand the different ways that this affects the life outcomes of Black youths.

Transparency

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Author Contributions

E. Chen contributed the study hypotheses. G. H. Brody developed the study concept and design. T. Yu analyzed the data. All the authors interpreted the data, cowrote the manuscript, and approved the final manuscript for submission.

Declaration of Conflicting Interests

The author(s) declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

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Open Practices

Data and materials for this study have not been made publicly available, and the design and analysis plans were not preregistered.

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