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## Association between school racial/ethnic composition during adolescence and adult health

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### Abstract

**Objectives:** School racial/ethnic segregation in U.S. schools Differences in school racial/ethnic composition may increase health disparities by concentrating educational opportunities that confer long-term health benefits in schools serving predominantly white students. For racial minority students, high concentrations of white students may increase exposure to racism also associated with psychological stress, which may ultimately reduce the long-term health benefits from educational opportunities. Meanwhile associations of racial/ethnic academic tracking within schools and health have been mixed. We sought to test whether: 1) differences in racial/ethnic composition between schools and, 2) racial/ethnic distribution of students in academic tracks within schools are associated with long-term health benefits or risks for white, Black and Latinx students.

**Methods:** We analyzed the National Longitudinal Study of Adolescent to Adult Health (12,438 participants, collected 1994–2008), to test whether the school-level segregation (percent of non-Latinx white students at participants' school during adolescence) was associated with adult health outcomes at ages 18–26 & 24–32, controlling for contextual factors comparing Black, Latinx, and white students, and controlling for contextual factors. A secondary analysis explored whether racial/ethnic cohorting across levels of English courses was associated with each health outcome.

**Results:** Attending a school with a higher percent of white students was associated with higher adult depression scores, substance abuse, and worse self-rated health for black Black students;

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2021.113719>.

**lower depression scores, better self-rated health, and alcohol abuse for white students; and no health differences for Latinx students.** Greater within school racial/ethnic cohorting across English courses was associated with increased odds of alcohol abuse for white students; decreased odds of alcohol abuse for Black and Latinx students; and decreased odds of drug abuse for Black students.

**Conclusion:** Among Black youth, attending a school with a higher percentage of white students is associated with worse behavioral health in adulthood. Understanding the potential impacts of school racial/ethnic composition on health is critical to designing policies that maximize access to opportunity and health. Education policies should comprehensively address school quality and racism to maximize adult health.

### Keywords

Depression; Substance use; Race/ethnicity; School

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Access to high-quality schools is linked to both short and long-term education and health benefits (Dudovitz et al., 2016; Hanushek, 2004; Garcy and Berliner, 2018; Frisvold and Golberstein, 2011). Schools with smaller class sizes, high quality teachers, more parental involvement, higher student attendance, and higher per pupil spending are associated with improved academic outcomes, including better test scores and educational attainment (Dudovitz et al., 2016; Rivkin et al., 2005; Holzberger et al., 2020). Education outcomes are associated with a host of long-term health benefits, such as lower rates of depression and substance use, improved general health, and longer life expectancy (Cutler and Lleras-Muney, 2006, 2010). Hence, education is a critical social determinant of health (Cohen and Syme, 2013). The association between improved health and education are explained by the conceptual model described by Garcy and Berliner(3) and thought to be driven by a variety of mechanisms, including: increased educational attainment, which leads to better career opportunities, financial and social capital, employer-based health insurance, and neighborhood mobility; improved health behaviors due to better decision-making, higher health literacy, and healthier social networks; and improved non-cognitive skills leading to improved psycho-social support and healthy coping strategies (Garcy and Berliner, 2018; Mazzonna, 2014; Conti and Hansman, 2013).

Racial disparities in access to high-quality schools are growing and may contribute to health and educational disparities. Although the overall proportion of students in public schools who are non-Latinx white has decreased over the decades, non-Latinx white students are less likely to attend the same schools as Black and Latinx students than in previous years (Coughlan, 2018; Walsemann et al., 2013; Fuller et al., 2019). This phenomenon has been attributed to demographic shifts, increasing school choice, and “white flight ” from public education (Coughlan, 2018; Rivkin, 2017; Phillips et al., 2015). Black and Latinx students are less likely than white students to attend schools with more educational opportunities, such as advanced placement classes, technology resources, greater per pupil spending, higher quality text books, and lower student-to-teacher ratios (Walsemann et al., 2013; Johnson, 2011), and this unequal access may contribute to worse academic and health outcomes (Garcy and Berliner, 2018; Kolluri, 2018; UCoC, 2018). Conversely, studies suggest large improvements in educational attainment and health for Black students

following desegregation policies from the 1960s–1980s that resulted in more racially diverse schools (including lower mortality, higher self-rated health, and lower pre-term births). (Frisvold and Golberstein, 2011; Johnson, 2011; Shen, 2018).

However, more recent studies of associations between school racial/ ethnic composition and health suggest that, for Black and Latinx students, attending schools with a higher proportion of non-Latinx white students, may be associated with increased stress and worse mental and behavioral health outcomes. For example, Black adolescents, attending a high school with a higher proportion of non-Latinx white students has been associated with higher levels of depressive and somatic symptoms (e.g. headache, stomach ache, chest pain) and greater likelihood of smoking during high school (Echenique et al., 2006; Walsemann et al., 2011), higher rates of lifetime prescription drug abuse (Ehnholt et al., 2018), and lower self-rated health during adolescence and adulthood. Similarly, for Latinx adolescents, attending a high school with more non-Latinx white students is associated with increased smoking risk (Echenique et al., 2006). Conversely, attending a school with a higher density of racially and ethnically concordant peers is associated with better adolescent mental health for nearly all racial and ethnic groups (DuPont-Reyes and Villatoro, 2019). Thus, the potential health benefits of attending a majority white, high quality school may be diminished for Black and Latinx students, if it is accompanied by increased stress (Assari, 2020). Hence, it remains unknown whether, for Black and Latinx students, attending a school with more non-Latinx White students is associated with positive or negative long-term health outcomes.

Even within racially and ethnically diverse schools, due to the distribution of students across classrooms, which often occurs based on academic tracking, some students may experience a less diverse classroom than might be predicted based on the overall school composition (Diette, 2012). This phenomenon of cohorting students in classes with those of a similar race or ethnicity may be driven by a variety of factors including differential access to earlier educational and family resources resulting in different levels of academic preparedness, as well as implicit bias or explicit bias of teachers and administrators (Oakes and Guiton, 1995; Yonezawa et al., 2002; Ballón, 2008). Racial/ethnic cohorting within schools may be associated with health through the same pathways as overall racial/ethnic school composition, affecting both educational opportunities and psychological wellbeing. The impact of racial cohorting within schools on long-term health outcomes for Black and Latinx students is poorly understood. A 2011 study showed mixed results with greater racial cohorting within school associated with lower rates of substance use for Black girls but also lower educational aspirations for Black boys (Walsemann and Bell, 2010). That study did not examine longitudinal outcomes nor test associations with health outcomes for Latinx students.

Few studies have addressed the question of whether both aspects of school racial and ethnic composition—the racial/ethnic distribution of students between schools and within schools—have long-term health benefits or risks for Black and Latinx students (Walsemann et al., 2013). To address this gap, we conducted a secondary analysis of the National Longitudinal Study of Adolescent to Adult Health, investigating whether school racial/ethnic composition is associated with adult mental, general, and behavioral health. We also

conducted an exploratory sub-analysis of within school racial/ethnic cohorting across levels of English courses and adult health. Understanding the impact of school racial and ethnic composition on health is critical to designing education and health policies that maximize access to both educational opportunity and health, and that work towards more equitable futures for historically disadvantaged groups.

## 1. Methods

We performed a secondary analysis of the National Longitudinal Study of Adolescent to Adult Health (Add Health) study, a longitudinal, nationally representative study of U.S. students in grades 7–12 during the 1994–95 school year.<sup>19</sup> We used demographic data from the Wave 1 inhome interview (collected 1994–1995), Wave 3 high school transcript data and school-sampling weights to create measures of school racial/ethnic composition and within-school cohorting by race/ethnicity across levels of English courses. Data from the Waves 3 and 4 interview regarding respondents' life and health outcomes in 2001–2002 when respondents were 18–26 years old and in 2008 when respondents were 24–32 years old, respectively, were used to create outcome measures. The analytic sample included 12,438 individuals who attended public school with complete data on the primary outcome (Wave 4 depression), primary predictor (percent of non-Latinx white students at the participant's school), and Wave 4 sample weight.

### 1.1. Measures

**Between school racial/ethnic composition:** As in previous studies, we used the percent of non-Latinx white students at the school as a measure of school racial/ethnic composition, which is likely to serve as a marker for both increased educational opportunities and non-random sorting by race/ethnicity, when controlling for racial composition at the neighborhood level (Walsemann et al., 2011; Goosby and Walsemann, 2012). We used the reported proportion of non-Latinx white students in the school in 1994–1995 and rescaled the variable so that a 1-unit change represents a 5-point increase in the percent of white students.

**Within school cohorting:** To assess for within school cohorting by race/ethnicity—whether students tend to be “tracked” within a school by race/ethnicity versus being evenly distributed across course levels—we created an Index of Dissimilarity (Walsemann and Bell, 2010). Similar to other investigators (Walsemann and Bell, 2010), we used the level of high school English courses participants were enrolled in (i.e., honors, general, remedial, or no English) and compared the racial/ethnic distribution across these course levels to the racial/ethnic make-up of the whole school during the 1994–1995 school year. A higher score indicates greater dissimilarity from the school's overall racial or ethnic distribution and hence greater cohorting by race/ethnicity across academic tracks within the school. We created three separate indices of dissimilarity: Black vs. white, Latinx vs. white, and non-white vs. white. We limited this variable to high schools where we had English course information on at least 10 students in each racial or ethnic group in the dataset to increase our confidence that the index could capture the degree to which students were generally sorted by race/ethnicity across classes within that school (see appendix for further details).

**Health Outcomes:** Each outcome was determined for both Wave 3 and Wave 4 to examine health during the transition to college and into middle adulthood. Due to differences in the items administered the definition of these outcomes varied slightly across each wave (see appendix). Our primary outcome was depression symptoms, as measured by the CES-D depression score (Carpenter et al., 1998). The Wave 3 survey included 9 items assessing for depression symptoms during the past seven days, with a possible range from 0 to 27. The Wave 4 survey included 10 items screening for depression symptoms during the past seven days, with a possible range from 0 to 30. Both the 9-item and 10-item CES-D scales are validated scales with higher scores indicating greater symptoms of depression. (Santor and Coyne, 1997). We focus on depression because it is common throughout adulthood and linked to a host of important life and health outcomes (Greden, 2001; Zheng et al., 1997). Further, previous studies have documented both associations between adolescent depression and exposure to non-Latinx whites during adolescence and adult depression and school quality (Dudovitz et al., 2016; Walsemann et al., 2011).

Our secondary outcomes included general self-rated health (participants rated their general health as excellent, very good, good, fair, or poor) resulting in a 1–5 score with higher score indicating worse health; (Idler and Benyamini, 1997) alcohol abuse; and drug abuse. Alcohol and drug abuse were determined based on participants' responses to items that asked about life problems related to alcohol use and marijuana use, including problems at work or school, endangering self or others, legal problems, and inter-personal problems. These items align with the diagnostic criteria for a substance use disorder (Hasin et al., 2006). In Wave 3, the survey asked about six alcohol-related problems and six drug-related problems. In Wave 4, the survey asked about four alcohol-related problems and eight drug-related problems (see technical appendix for details regarding the specific life problems asked in each wave). Participants who reported at least two episodes of alcohol-related life problems were considered to have alcohol abuse (Hasin et al., 2013). Similarly, participants who reported at least two episodes of substance-use related life problems were considered to have substance abuse.

**Covariates:** All covariates were from Wave 1 and were selected for their potential to influence the schools participants attended and their health. At the individual level, we controlled for participant sex and age. At the family level, we controlled for family structure, parental level of education, and household income. Finally, at the neighborhood level, we controlled for neighborhood unemployment and the proportion of non-Latinx white residents at the level of census block group, to capture discrepancies between community- and school-level racial compositions.

## 1.2. Data analysis

Weighted means, percentages, and proportions of our predictors, outcomes, and covariates were examined across racial/ethnic groups. Multilevel mixed effects regression models with random intercepts for schools, stratified by student race/ethnicity, tested whether between school segregation (percent of non-Latinx white students at school) was associated with the adult health outcomes in Wave 3 and Wave 4, controlling for covariates. Separate analyses were conducted for white students, Black students, and Latinx students. Similar models also

tested whether academic tracking was associated with each health outcome at Wave 3 and Wave 4 on the subset of students for whom the data set contained transcript data allowing for the calculation of the within school racial/ethnic cohorting measure. In addition, we introduced interaction terms into the models (academic tracking\* percent of non-Latinx white students) to test whether academic tracking within schools compounded associations between school racial/ethnic composition and each health outcome. All analyses were conducted in Stata version 14 (StataCorp, College Station, Texas) using the “svy” suite of commands to account for the Add Health survey design elements of stratification, clustering, and weighting.

## 2. Results

Overall, 12,438 participants were in the analytic sample (79% of the total Wave 4 sample). As seen in Table 1, white students, on average, attended predominantly white schools, where the average percent of other white students at their schools was 83%. Conversely, Black and Latinx students, on average, attended predominantly non-white schools, where the average percent of white students was 35% and 38%, respectively. Black and Latinx participants also had higher depression scores than white participants at both Wave 3 and Wave 4, as well as worse self-rated health at Wave 4. Meanwhile, alcohol and drug abuse were most common among white participants and least common among Black participants. All health outcomes, on average, worsened as the sample aged. In addition, compared to white and Latinx participants, Black participants less frequently lived in a 2-parent household during adolescence. More parents of white participants had a college degree or higher and earned more than \$75,000 per year than Black or Latinx participants. The average neighborhood unemployment rate was also highest for Black participants. While white and Latinx participants lived in predominantly white neighborhoods, Black participants lived in predominantly non-white neighborhoods.

Table 2 shows results from our main analysis. For white students, attending a school with a higher percentage of other non-Latinx white students was associated with lower depression scores at Wave 4 and better self-rated health at Waves 3 and 4, but increased odds of alcohol abuse during Waves 3 and 4. For every 5 percentage point increase in other white students at their school, white participants experienced, on average, a 0.11-point decrease in their depression score at Wave 4, a 0.01-point improvement in their self-rated health scores at Waves 3 and 4, a 1.09 times increase in the odds of alcohol abuse at Wave 3, and a 1.04 times increase in the odds of alcohol abuse at Wave 4.

For Black students, attending a school with a higher percent of non-Latinx white students was associated with higher depression scores during Wave 4, worse self-rated health at Wave 4, and increased odds of substance abuse at Wave 3. On average, a 5 percentage point increase in white students at their school was associated with a 0.05-point increase in their depression score during Wave 4, a 0.01-point worsening of their self-rated health score at Wave 4, and a 1.08 times increase in their odds of substance abuse at Wave 3.

The percent of non-Latinx white students at a participant’s school was not associated with adult health for Latinx participants.



As seen in Table 3, greater racial/ethnic cohorting within school was associated with an increased odds of alcohol abuse during Wave 3 for white students, but this association disappeared by Wave 4. For Black students, greater racial cohorting within school was associated with decreased odds of alcohol abuse at Wave 4 and substance abuse at Waves 3 and 4. Similarly, for Latinx students, greater ethnic cohorting within school was associated with lower odds of alcohol abuse at Wave 4. We did not find evidence that racial/ethnic cohorting within schools compounded associations between the percent of non-Latinx white students at school and health.

### 3. Discussion

This is the first study to examine long-term mental and behavioral health outcomes for Black, white, and Latinx students in relation to school racial/ethnic composition during adolescence. We find that both attending a school with a higher percentage of white students and attending a school with less academic cohorting by race or ethnicity is associated with worse mental and behavioral health outcomes for Black students. Among Black youth, attending a school with a higher percentage of white students was associated with long-term depression symptoms, lower self-rated health, and substance use, despite potential access to greater educational opportunities. Further, less racial cohorting within schools was also associated with more substance use in adulthood.

For Latinx participants, attending a school with a higher percentage of white students was not associated with either adverse or positive health. Additionally, for Latinx students, greater ethnic cohorting within schools was associated with lower odds of long-term alcohol abuse only. While we cannot determine the reasons for these associations in this study, previous studies suggest that acculturation stress related to accommodating to a white-dominant culture and exposure to discrimination is associated with poor health outcomes, particularly in the areas of mental and behavioral health (Gonzalez-Guarda et al., 2020). This could be consistent with the absence of positive associations between greater exposure to non-Latinx white students and health which were observed in the models restricted to non-Latinx white students. Similarly, while we cannot determine the specific reason for observing fewer associations between school racial/ethnic composition and health for Latinx versus Black participants, these findings are in line with evidence of structural racism throughout U.S. institutions that disproportionately impact Black Americans (Bailey et al., 2017). For example, numerous historical practices, such as “redlining,” which discouraged home loans in communities of color, have resulted in cumulative disadvantage for Black Americans, limiting access to a broad set of economic and social resources that impact health, including access to high quality schools, and spans generations (Krieger et al., 2020).

Our findings are largely consistent with the hypothesis that, for Black students, some of the health benefits conferred by attending a school with potentially greater educational opportunities may be diminished when accompanied by greater exposure to white students. Indeed, prior studies suggest that increased exposure to white students may increase minority students’ exposure to interpersonal racism (Wolinsky et al., 2012; Bellmore et al., 2012), a critical social determinant of health throughout the life course (Trent et al., 2019; Heard-Garris et al., 2018a). Inter-personal racism includes both direct and vicarious

experiences of prejudice and discrimination, both of which are associated with psychological stress and negative health outcomes (Heard-Garris et al., 2018b; Harrell, 2000; Paradies et al., 2015). Previous studies examining short-term associations between school racial and ethnic composition and health found Black students' increased exposure to non-Latinx white students is associated with more perceived discrimination (Walsemann et al., 2011; Bellmore et al., 2012) as well as poor adolescent mental health and substance (Walsemann et al., 2011; Walsemann and Bell, 2010). In addition, longitudinal studies found worse adult physical health for Black students with increased exposure to non-Latinx white students (Goosby and Walsemann, 2012; Wolinsky et al., 2012), despite other studies documenting positive associations with short and long-term educational outcomes (Echenique et al., 2006; Walsemann and Bell, 2010).

In contrast, we found that for white students, attending a school with a higher percentage of other white students was associated with lower depression scores and better self-rated health. This finding might be explained by greater access to educational opportunities when attending schools with a higher percentage of white students, without the stress associated with minority race status. These mental health and self-rated health benefits to white students are evidence of racial health disparities on their own, regardless of any adverse health impacts seen for Latinx and Black students. In short, it appears that the majority of the observed mental and overall health benefits associated with an increasing proportion of white students at a given school accrue only to white students. This unequal accrual of health benefit of predominantly white schools may be one driver of health inequity.

Interestingly, attending a school with a higher percentage of non-Latinx white students for white and Black students, greater racial cohorting within school for white students and less racial/ethnic cohorting within schools for Black and Latinx students were all associated with increased substance use. As seen in this sample, substance abuse is more common among white youth and adults than in other racial and ethnic groups (Delker et al., 2016; Evans et al., 2017). Exposure to substance-using peers and school-level substance use norms during adolescence are thought to be key predictors of current and future substance use (Fletcher et al., 2008; Kuntsche and Jordan, 2006; Dudovitz et al., 2018). In addition, increased educational opportunities during adolescence may lead to greater rates of college attendance (UCoC, 2018). College attendance may reinforce substance use, as it may increase both the access to and social pressure to engage in substance use (Kirst et al., 2014).

Although the effect sizes reported here appear small, they are likely still relevant, especially at the population level. For example, the change in depression score for the average non-Latinx white student associated with attending a school with 83% versus 35% attendance of other non-Latinx white students (the average for non-Latinx white students versus the average for Black students in this sample) is 1.06 points on the CES-D depression symptom scale. This effect size is larger than that observed in our multivariate model associated with the largest income difference (coefficient 0.956) of earning more than \$75,000 a year versus less than \$25,000 a year and similar to that associated with graduating high school versus not (coefficient 1.09).



Our results suggest associations between school racial/ethnic composition and mental and general health were stronger as participants aged, whereas associations between school racial/ethnic composition and substance use were consistently found during both young and early-middle adulthood. This may reflect differences in the prevalence of these conditions across different age groups or an accumulation of mental and physical health risks due to toxic stress, particularly for Black students (Williams and Mohammed, 2013). Indeed, the educational opportunities potentially afforded by attending a predominantly white school may facilitate attending college and graduate school, pursuing professional careers, and living in more well resourced communities, all of which may further increase exposure to white peers, inter-personal racism, and psychological stress. Future studies might explicitly test these potential mediating processes to identify leverage points for intervention across the life course.

Although the use of a nationally representative, longitudinal data set is a strength, this study is limited by the variables available in the Add Health dataset. While we were able to control for a number of important contextual variables at the individual, family, neighborhood, and school level, we cannot exclude the possibility that our findings are driven by unmeasured confounders. We cannot account for a host of factors that may be associated with greater exposure to white students both during adolescents and throughout the life course. As a result, we cannot explicitly test whether racism mediates associations between school racial/ethnic composition and adult health. In addition, we cannot determine the underlying drivers of racial/ethnic cohorting of students between and within schools. For example, it is possible that these differences are driven by family preference, school proximity, or differential academic preparation, though many of these factor may also be rooted in structural and interpersonal racism. Further, our measures of school racial/ethnic composition are limited to grades 7–12. Hence, it is unknown how school racial/ethnic composition at other stages of education and development relate to our findings (Gee et al., 2012). We also cannot distinguish between potential increased exposure to white students and decreased exposure to non-white students with these measures. Future studies might examine whether these have different associations with health outcomes. Further, while it is theoretically possible that some of our findings could reflect differences in the distribution of our primary predictor (% non-Latinx White at the school) by race/ethnicity, the substantial overlap in the distribution of this variable across racial/ethnic groups makes this unlikely (see technical appendix). In addition, while the availability of long-term follow up is a strength of the dataset, participants in this sample attended public high schools in the 1990s, and their experiences may not reflect those of current students nor of private school students.

This study has important implications for policy makers. Our results emphasize the importance of considering how education practices may have a differential impact on health, potentially exacerbating health disparities across different racial and ethnic groups. For example, associations between school racial/ethnic composition and long-term mental health were largely in opposite directions for white as compared to Black students. To be clear, we do not mean to imply that racial and ethnic diversity in schools causes depression for Black students, nor that racial segregation should be a policy goal. However, it is important to acknowledge that schools provide both critical access to education as well as social opportunities to form relationships with peers and exposure to social norms and expectations

that are important determinants of health (Dudovitz et al., 2017; Noguera, 2019). Hence, our school policies and practices should attempt to facilitate school environments that not only promote academic success but also support psychosocial well-being across the life course for students of all races and ethnicities. This may require paying special attention to and intervening on inter-personal (both direct and vicarious) and institutional racism in schools. For example, studies suggest incorporating self-affirmation practices into classrooms, increasing faculty racial and ethnic diversity, and eliminating harsh disciplinary practices can help cultivate psychologically safe environments for racial minority students (Trent et al., 2019; Cohen et al., 2009; Goyer et al., 2017; Todi c et al., 2020; Anyon et al., 2016; Chambers and Erausquin, 2018).

Put another way, results suggest policies that purely focus on increasing access to educational opportunities without addressing interpersonal and institutional racism may be unlikely to successfully mitigate racial health disparities long-term. For example, school voucher programs that increase access to private or charter schools may provide a small but statistically significant increase in educational opportunities for some students (Krueger and Zhu, 2004), but are unlikely to address the root causes of stress associated with marginalization and exposure to inter-personal racism. Instead, policies that enhance the quality of all schools serving minority students may be more effective at improving both education and health. Further, efforts to acknowledge and reduce implicit and explicit bias (racism characterized by unconscious or conscious assumptions about the abilities, motives, or intents of others on the basis of race), both at the level of individual interactions and within educational institutions, may facilitate long-term health equity (Trent et al., 2019). In summary, understanding the potential impacts of school racial/ethnic composition on health is critical to designing policies and practices that maximize access to both educational opportunity and health.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**Table 1**

Sample characteristics.

Variable	Whole Sample N = 12,438	White N = 7370 mean/% (s.d./n)	Black N = 2998 mean/% (s.d./n)	Latinx N = 2070 mean/% (s.d./n)	P-Value
% non-Latinx white students attending school	69.2% (31.0)	82.9% (18.3)	35.2% (32.9)	37.8% (35.3)	<0.001
Index of dissimilarity		23.4 (12.2)	17.5 (14.7)	25.5 (9.7)	
Depression score, W3	4.5 (3.9)	4.2 (3.5)	5.1 (5.0)	5.1 (5.1)	<0.001
Depression score, W4	6.1 (4.7)	5.8 (4.2)	7.1 (5.9)	6.5 (5.3)	<0.001
Self-rated health, W3	2.0 (0.9)	2.0 (0.8)	2.0 (1.1)	2.0 (1.1)	0.892
Self-rated health, W4	2.4 (0.9)	2.3 (0.8)	2.5 (1.1)	2.5 (1.1)	<0.001
Alcohol abuse, W3	14.2	16.5	7.5	9.2	<0.001
Alcohol abuse, W4	23.8	28.5	9.4	16.9	<0.001
Drug abuse, W3	7.8	8.6	5.5	6.2	0.002
Drug abuse, W4	12.4	13.9	7.1	11.2	<0.001
Sex (Male)	50.3	50.2	50.0	51.2	0.857
Age at Wave 1	15.5 (1.8)	15.4 (1.6)	15.7 (2.1)	15.6 (2.1)	0.473
Family structure					<0.001
2 biological parents	53.2	59.2	27.9	54.9	
2 parents	17.1	18.1	14.2	15.3	
Single parent	23.8	18.5	45.1	24.0	
Other	5.9	4.3	12.8	5.8	
Parental education					<0.001
Less than high school	10.3	6.5	9.5	34.9	
High school/GED	33.2	32.0	41.0	29.1	
Some college	22.2	23.5	20.3	16.4	
College degree or higher	34.4	38.0	29.2	19.5	
Household income					<0.001
Less than \$25k	23.6	18.0	38.5	35.2	
\$25k–\$49k	26.8	28.4	21.3	24.8	
\$50k–\$74k	17.8	21.9	7.2	9.4	
\$75k or more	10.3	12.9	3.5	4.3	
Missing	21.6	18.8	29.5	26.5	
Neighborhood unemployment rate	0.08 (0.06)	0.07 (0.04)	0.12 (0.09)	0.09 (0.06)	<0.001
Proportion non-Latinx white residents in neighborhood	0.80 (0.28)	0.92 (0.11)	0.38 (0.37)	0.70 (0.27)	<0.001

P-value indicates significant differences by race/ethnicity. Weighted percentages, proportions, and means are presented. We used a Wave 3 sampling weight for the Wave 3 outcomes. For the other variables, we used a Wave 4 sampling weight. % = percent; s.d. = standard deviation.



**Table 2**

Adjusted associations between school racial/ethnic composition during adolescence and adult health outcomes stratified by race/ethnicity.

	White	Black	Latinx
Continuous Outcomes	Coefficient	Coefficient	Coefficient
Depression score			
Wave 3	-0.04	0.05	-0.02
Wave 4	***-0.11	*0.05	0.06
Poor Self-rated Health			
Wave 3	*-0.01	0.00	0.00
Wave 4	*-0.01	*0.01	0.00
Binary Outcomes			
Alcohol Abuse			
Wave 3	***1.09	1.04	1.00
Wave 4	*1.04	1.00	1.04
Drug Abuse			
Wave 3	1.02	**1.08	0.98
Wave 4	0.99	1.02	0.98

A 1-unit change in the percent of non-Latinx white students represents a 5 percentage point increase. Models control for gender, age, family structure, parental education, household income, neighborhood unemployment rate, and neighborhood proportion of non-Latinx white residents. We used sampling weights from the dataset each outcome is drawn from.

\*  
p < 0.05

\*\*  
p < 0.01

\*\*\*  
p < 0.001.

Note: higher poor self-rated health indicates worse perceived health. Wave 3 corresponds to ages 18–26; wave 4 corresponds to ages 24–32.

**Table 3**

Adjusted associations between racial/ethnic academic tracking during adolescence and adult health outcomes stratified by race/ethnicity.

	White	Black	Latinx
Continuous Outcomes	Coefficient	Coefficient	Coefficient
Depression score			
Wave 3	0.09	-0.08	0.23
Wave 4	0.09	0.02	0.11
Poor Self-rated Health			
Wave 3	0.00	-0.03	0.01
Wave 4	-0.01	-0.01	-0.03
Binary Outcomes			
	Odds Ratio	Odds Ratio	Odds Ratio
Alcohol Abuse			
Wave 3	**1.13	0.79	0.95
Wave 4	1.02	*0.87	*0.78
Drug Abuse			
Wave 3	1.06	*0.76	1.00
Wave 4	1.01	*0.80	0.87

A 1-unit change in the index of dissimilarity represents a 5 percentage point increase. The non-white vs. white index of dissimilarity was used for models with white students, the Black vs. white index of dissimilarity was used for models with Black students, and the Latinx vs. white index of dissimilarity was used for models with Latinx students. All models control for gender, age, family structure, parental education, household income, neighborhood unemployment rate, and neighborhood proportion of non-Latinx white residents. We used sampling weights from the dataset each outcome is drawn from.

\*  
p < 0.05

\*\*  
p < 0.01

\*\*\*  
p < 0.001.

Note: higher poor self-rated health indicates worse perceived health. Wave 3 corresponds to ages 18–26; wave 4 corresponds to ages 24–32.