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Tracking Health Inequalities from High School to Midlife

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Abstract

Educational gradients in health status, morbidity, and mortality are well established, but which aspects of schooling produce those gradients is only partially understood. We draw on newly available data from the midlife follow-up of the High School and Beyond sophomore cohort to analyze the relationship between students' level of coursework in high school and their long-term health outcomes. We additionally evaluate the mediating roles of skill development, postsecondary attendance and degree attainment, and occupational characteristics. We find that students who took a medium- to high-level course of study in high school have better self-reported health and physical functioning in midlife, even net of family background, adolescent health, baseline skills, and school characteristics. The association partially operates through pathways into postsecondary education. Our findings have implications for both educational policy and research on the educational gradient in health.

Individuals with more education have longer life expectancy and report better health than those with less education (Montez, Hummer, and Hayward 2012; Ross and Wu 1995). Education enhances health and longevity, in part because it supports the development of cognitive and noncognitive skills, such as literacy, problem solving, and a personal sense of control and grants individuals access to occupations with greater earnings and fewer hazards of illness or injury (Fletcher 2012; Kaestner and Callison 2011; Mirowsky and Ross 2007; Moore and Hayward 1990). However, students have diverse experiences within educational institutions, including what they learn and how they learn it. In high school, students' course-taking patterns shape their classroom experiences (Oakes 1985), the cognitive and noncognitive skills they acquire in school (Carbonaro 2005; Gamoran 1992), the chances

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they will attend and complete college (Gaertner et al. 2013), and their labor force participation in adulthood (Arum and Shavit 1995; Bowles and Gintis 2002; Rose and Betts 2004). Thus, high school course-taking has the potential to contribute to health status in adulthood.

In this paper, we investigate the relationship between the level of coursework taken in high school and health disparities in midlife. We define course-taking patterns across math, science, and foreign language courses and adjudicate between regular and honors courses based on student high school transcripts. The coursework levels indicate the types of learning opportunities students realized, from low-level general courses to high-level advanced courses. We additionally examine three possible mechanisms between course-taking and midlife health—skill development, postsecondary attendance and degree attainment, and occupational characteristics—to understand how processes during and after high school may account for differences in midlife health by high school course-taking. By combining literatures on health, work, and education, we aim to develop a better understanding of how educational gradients in health emerge and which dimensions of education contribute to population health inequalities. Our findings suggest that high school course-taking has long-term implications for health.

Background

The Link Between Education and Health

Individuals with more years of education and higher-level degrees have better physical functioning, higher self-reported health, fewer medical conditions, and a lower risk of mortality than those with lower levels of education (Montez et al. 2012; Ross and Wu 1995). In the past thirty years, medical advances have made conditions easier to diagnose and treat, minimizing risks of disease and death, but the gaps in health by education persist; the difference in mortality rates and self-reported health by education level is higher than ever before (Goesling 2007; Hayward et al. 2015). There are gaps in self-reported health status and physical functioning by education across the life course (Warren 2009), but some research suggests disparities are most pronounced in midlife (Benjamins et al. 2004). In this study, we investigate how diverse experiences within high school—as reflected by the level of high school coursework—are related to self-reported health status and physical functioning in midlife. Figure 1 displays our conceptual model, linking high school course-taking to health in midlife. The mechanisms are related to each other—skill development during high school shapes pathways into postsecondary institutions and degree attainment shapes access to different types of occupations in early adulthood—but variation in these pathways remains and may be related to the courses students took in high school and their midlife health.

High School Course-Taking Patterns

In high school, students' daily lives are organized around the sets of courses they take each year (Frank et al. 2008). Curricula may differ in level of difficulty and challenge and involve different pedagogical approaches, supporting unequal access to learning opportunities. Low-level courses focus on basic levels of knowledge, conformity, and discipline, whereas

advanced courses give students access to specialized knowledge, analytic skills, creativity, and independent thinking (Anyon 1981; Ferrare 2012; Oakes 1985). School tracking systems are a form of curricular organization that create pathways (“tracks”) that students follow throughout their education, taking courses in every subject area at the same level and with the same students. By 1980, when our sample was in high school, schools began dismantling these tracking systems (“detracking”), but the process was not consistent across schools (Lucas 1999; Oakes et al. 1997). Although students in some schools still took courses at a single level across subjects, students in other schools took courses in mixed levels across subjects. In this study, we consider the level of academic courses that students took and the consistency in course levels across subject areas. In advanced courses, teachers generally support students guiding their own learning and working collaboratively with peers (Oakes 1985). These courses additionally expose students to curricular content to prepare for college, such as algebra II, foreign language, or physics. Students at the bottom of the high school academic hierarchy do not have exposure to these courses, limiting their future pathways. They also may be taught in less supportive classroom environments, with less prepared teachers, more rules, and fewer resources (Oakes 1985; Rosenbaum 1978). More advanced coursework supports the development of flexible resources that students bring with them as they transition to college or the workforce. We consider the possibility that it may also equip individuals to maintain better health in midlife.

Assignment into high school courses is largely a function of academic preparation and family and sociodemographic background. Students’ academic preparation in middle school or early high school—such as their cognitive skills, content exposure, school effort, and risk-taking—is reflected in their scores on assessment tests, grades, and locus of control, or the perceived ability to control what happens in life. Although the intended purpose of curricular differentiation is to have students of similar abilities in the same classroom for instructional efficiency (Hallinan 1994), often students take less demanding courses than their skills suggest they are prepared for. School assignment policies, teacher recommendations, and student choices can influence whether students are underplaced in coursework, especially for students from lower socioeconomic families, students of color, and students with disabilities (Lucas 2001; Riegle-Crumb 2006; Shifrer et al. 2013; Sorensen 1970; Southworth and Mickelson 2007). Academic preparation in adolescence and family social status are positively associated with health later in life (Clouston et al. 2015; Hayward and Gorman 2004; Herd 2010; Hitlin and Johnson 2015). Our analyses take into account factors that contribute to high school students’ heterogeneous course-taking to estimate the effects of course-taking on health in midlife. Following research that finds a causal relationship between health and education when considering selection factors (Brunello et al. 2016; Walsemann et al. 2008; Warren 2009), our first hypothesis is:

H1: Taking more advanced high school coursework will be positively associated with health in midlife, conditional on family and sociodemographic background, academic preparation, health in adolescence, and school factors.

We find confirmation of our first hypothesis; advanced course-taking positively predicts midlife health. Because course-taking is partly a function of academic preparation (test scores, grades, and locus of control) and partly due to factors that predict preparation (family

background, health, school practices, student choices), we take our analysis one step further and simulate what individuals' health would be in midlife if their course-taking level had been at least as high as they were prepared to take, based on their sophomore year academic preparation. We also analyze the potential mediators of this link, which are described below.

Skill Development

Part of the link between educational attainment and health is through the development of skills that enhance people's capacities to make choices that lead to better health (Cutler and Lleras-Muney 2010). Individuals who are more adept in written and verbal communication and problem solving are better able to understand and use new information about health (DeWalt et al. 2004). Additionally, individuals with a higher locus of control report better health in early and late adulthood (Hitlin and Johnson 2015; Mirowsky and Ross 2007; Ross and Wu 1995). Adolescence is a critical period for developing skills that will aid individuals in their transition to adulthood, when lifestyle decisions can influence health trajectories over the life course. For example, adolescents with higher test scores and academic performance report better health and fewer chronic conditions in midlife (Herd 2010). Locus of control generally increases during adolescence as individuals are given more opportunities for autonomy and fewer constraints on their choices (Lewis, Ross, and Mirowsky 1999). These cognitive and noncognitive skills that are important for health later in life are influenced by the level of coursework students take in high school.

Learning opportunities and skill development in high school differ according to the level of coursework. For example, Gamoran (1992) found that students who took an academic curriculum on average answered about 1.5 more questions correctly on a math test (about one-fifth of a standard deviation) and 1 more question correctly on a verbal test (about one-eighth of a standard deviation) between their sophomore and senior years than students in a general curriculum. Students' grades, which reflect how well students meet their course requirements, are also related to the level of coursework. Students in higher-level courses on average have higher grades than students in lower-level courses, even when excluding the boosts in grades some schools offer students for taking honors or Advanced Placement (AP) courses (Linver and Davis-Kean 2005; Rosenbaum 1978). High school coursework may also shape the development of students' locus of control. Teachers in low-level courses emphasize conformity and following the rules, limiting students' abilities to make their own decisions, whereas teachers in advanced courses emphasize questioning authority and working independently, giving students more freedom (Oakes 1985). Students' classroom experiences may dampen noncognitive skill gains during high school (Carbonaro 2005; Karlson 2015). We assess whether the association between course-taking and health operates through variability in skill development during high school. Specifically, we examine changes in achievement test scores, grade point average (GPA), and locus of control between the sophomore and senior years of high school. In light of the research on course-taking, skills, and health, our second hypothesis is:

H2: Conditional on selection into course-taking, skill development during adolescence will be associated with health in midlife and will mediate part, but not all, of the association between course-taking and health in midlife.

Postsecondary Attendance and Degree Attainment

High school learning opportunities also shape students' pathways into the stratified adult world of college and work, and their health outcomes are determined in part by where they land. Individuals who continue their education after high school receive a boost in health for each additional year of schooling, but big advantages appear with a college degree (Hayward et al. 2015). College not only supports further skill development and helps individuals get access to better jobs; it also places individuals in advantaged social positions where they can avoid the default American lifestyle, characterized by processed foods, immobility, and an overreliance on medications (Mirowsky and Ross 2015). Adults with a college degree have higher self-reported health and physical functioning and lower rates of obesity and mortality than those with only a high school diploma (Montez et al. 2012; Ross and Wu 1995). As more people have access to higher education, qualitative distinctions between levels of education become increasingly important. The selectivity and prestige of the institution one attends signals where a person belongs in the status hierarchy (Collins 1971), and health outcomes may improve with each step up the ladder (Ross and Mirowsky 1999). The level of coursework students take in high school may be related to health through its influence on postsecondary entry and persistence.

The learning opportunities granted to students in different levels of courses make certain adulthood destinations more or less probable (Ferrare 2012). Students in advanced coursework are socialized to think of college as the natural next step in their lives (Karlson 2015) and are more likely to enter college within four years of high school (Arum and Shavit 1995). These high-level courses are positively related to postsecondary persistence and eventual degree attainment and are stronger predictors of these outcomes than family background (Adelman 2005; Long et al. 2012). Students at the top of the academic hierarchy in high school are also more likely to get into and go to selective colleges (Davies and Guppy 1997). We assess whether the association between high school course-taking and health operates through postsecondary attendance and completion, also considering when students enter college and the selectivity of the institution. Following health research that finds a strong link between postsecondary education and health outcomes, our third hypothesis is:

H3: Conditional on selection into course-taking and skill development during adolescence, postsecondary attendance and degree attainment will be related to health in midlife and mediate part, but not all, of the association between course-taking and health in midlife.

Occupational Characteristics

The jobs individuals secure in early adulthood place them on labor force trajectories through midlife that shape health outcomes (Fletcher 2012). We focus on three labor market factors that are related to students' education and may shape midlife health. First, having steady employment benefits health. Individuals who are unemployed report lower physical functioning and have higher risks of mortality than employed individuals (Moore and Hayward 1990; Ross and Wu 1995). Second, the types of activities individuals perform on the job matter. Individuals with routine manual jobs that require repetitive motions and

physical exertion have higher rates of mortality, arthritis, and heart attack than individuals without blue collar employment (Fletcher 2012; Moore and Hayward 1990). Third, those who make more money and are in prestigious jobs have more resources to help them control their health (Gueorguieva et al. 2009). High-status jobs are also more likely to require complex thought and offer more autonomy, which is beneficial to health (Mirowsky and Ross 2007). Although postsecondary degrees generally promote access to better occupations, there is heterogeneity in labor market experiences and occupational task demands within levels of education that may be related to high school course-taking and midlife health.

Positioning along each of these three job dimensions is guided by students' course-taking experiences in high school. Students in advanced coursework are more likely to be employed in well-paying jobs that require little physical exertion than students in low-level courses (Arum and Shavit 1995; Bowles and Gintis 2002). For example, students who took advanced math in high school on average have higher earnings in early adulthood, even when conditioning on educational attainment (Rose and Betts 2004). The link between high school coursework and health in midlife may operate through individuals' occupational characteristics in early adulthood. Early labor market experiences shape the employment patterns, daily tasks, social status, and lifetime wages of individuals, which are important for midlife health outcomes (Halpern-Manners et al. 2015). We assess how much unemployment, physical job tasks, and occupational wages explain the observed association between course-taking and health. Our fourth hypothesis is:

H4: Conditional on skill development during adolescence, postsecondary attendance and degree attainment, and selection into course-taking, occupational characteristics will be related to health in midlife and mediate part, but not all, of the association between course-taking and health in midlife.

In summary, our aim is to understand how diverse experiences in high school courses are related to long-term outcomes in health. Our research questions are:

1. Does the level of students' high school course-taking predict their health in midlife?
 - a. Does the association remain when controlling for background, academic preparation, health, and school factors that may affect both students' coursework and midlife health outcomes?
 - b. Is this association mediated by skill development, postsecondary attendance and degree attainment, and/or occupational characteristics in early adulthood? Are these indicators from adolescence and early adulthood independently associated with health at midlife?
2. What would be the impact on the distribution of health status in midlife if high school students took at least the highest level of coursework for which they were prepared?

Data and Methods

In this study, we use data from the sophomore cohort of High School and Beyond (HS&B:So), including the recent midlife follow-up. HS&B:So started in 1980 as a nationally representative sample of about 30,000 high school sophomores in public and private schools in the United States. This cohort was followed-up in 1982, and a panel was drawn for the 1984 survey ($n = 14,825$). Panel members were re-interviewed in 1986 and 1992. HS&B:So also collected high school and postsecondary transcripts for panel members. In 2014, these sample members were reinterviewed when they were about to turn fifty years old. About 60 percent of the eligible sample members answered the midlife follow-up survey ($n = 8,790^1$); a subsample completed an extended version of the survey ($n = 3,710$).

Our sample includes respondents who participated in the 1980, 1992, and 2014 surveys and who have high school transcript data available. For each analysis, we exclude those missing on the 2014 dependent variable of interest. Thus, we have a sample of 6,180 for the analysis of self-reported health status, which appeared on the survey for all respondents, and 2,990 for the analysis of physical functioning, which only appeared on the extended version of the survey. The weighted distributions of our two samples are similar across all of our independent variables. Table 1 and appendix A list the descriptive statistics for both samples for all of our analytic variables by midlife health.

Midlife Health

We assess health in midlife through self-reported health status and physical functioning. Self-reported health status is a subjective indicator of overall well-being that is strongly related to morbidity and mortality and captures both the presence of mental and physical conditions and the perception of how one's health compares to others (Link et al. 2008; Ross and Wu 1995). Physical functioning indicates how well individuals can perform daily activities. Although physical functioning and self-reported health status are highly correlated, they give separate pictures of health: individuals' perceptions of their health and their physical limitations. We created an ordinal measure of self-reported health status from the 2014 survey (1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent). On the extended form of the 2014 survey, respondents answered ten questions about their physical functioning: whether they are now and expect to be limited for at least three months in walking, running, sitting, getting up, climbing stairs, kneeling, reaching, pushing, lifting, and picking up items. We considered individuals to have difficulty with a task if they responded yes, can't do, or don't do. We created a standardized, averaged scale of these items as a continuous outcome variable and use the inverse, with higher values signaling better physical functioning ($\alpha = 0.87$, range = -4 to 1.5).

High School Course-Taking

To analyze the level of coursework taken in high school, we created a measure that considers the level of courses taken and the consistency in course levels across subjects. We based this

¹All sample size numbers are rounded to the nearest 10, per National Center for Education Statistics guidelines.

measure on Arum and Shavit (1995), Lucas (1990), Adelman (1999), and the National Assessment of Educational Progress (NAEP) definition of a “rigorous” curriculum (Nord et al. 2011). To construct this variable, we use the highest level of coursework taken in math, science, and foreign language, as well as honors, International Baccalaureate (IB), or AP courses taken in any academic subject (math, science, foreign language, English, and social studies). Using the Classification of Secondary School Courses (CSSC) codes from student transcripts, we classified each course into subject areas and determined the level of the course. We classified these courses into course-taking levels, which indicate if a student took all low-level courses (algebra 1 or general math, general science or biology, no foreign language and no honors courses), mixed low-level courses (took at least one low-level course), medium-level courses (geometry, chemistry, and level 1 foreign language), mixed high-level courses (an honors course AND algebra 2 or above, advanced science OR level 2 foreign language and above), and all high-level courses (an honors course, algebra 2 or above, advanced science, AND level 2 foreign language and above). Appendix B shows the distribution of course-taking across all academic subject areas within each level of our course-taking measure.

Skills and Skill Development

To investigate the role of skill development, we assess how changes in achievement test scores, GPA, and locus of control during high school are related to course-taking and health. We use baseline (sophomore year) measures to adjust for prior differences in skills. We use change measures between sophomore and senior years to account for skill development. Students took a series of achievement tests during the sophomore year survey, which they repeated during their senior year. We combine scores on the math and reading tests as our measure of cognitive ability. The baseline variable indicates the number of questions answered correctly on these tests, and the change variable indicates the difference in the number of questions answered correctly in the sophomore and senior year tests. We constructed a measure of students' GPA by averaging the grades received in each graded course listed in student transcripts, weighted by the number of credits earned. Transcript grades were coded to a uniform standard across schools and range from 0 (for F) to 4 (for A).² The baseline variable only considers courses taken during the freshman and sophomore years of high school; the change variable indicates the difference between the junior and senior GPA and the freshman and sophomore GPA. The locus of control scale indicates how much individuals feel they have control over what happens to them, with higher values indicating more perceived internal control (Rotter 1966). The baseline measure is the average of answers from the sophomore year survey questions, and the change measure is the difference between the average of answers from the sophomore and senior year surveys.

Postsecondary Attendance and Degree Attainment

We use two indicators of students' experiences in postsecondary institutions. First, we include a measure of highest postsecondary attainment by early adulthood (1992), which distinguishes among students who attended college without receiving a degree, students who received an Associate's degree or certificate, students who received a Bachelor's degree

²Weighting of grades by honors or AP course-taking does not change our results.

from a nonselective institution, and students who received a Bachelor's degree from a selective institution, with not attending a postsecondary institution as the reference. This variable considers self-reports of degree attainment and enrollment and degrees listed in postsecondary transcripts. Second, we include a control for whether a student attended college within two and a half years of high school.

Occupational Characteristics

We estimate the role of three occupational characteristics in early adulthood: employment status, how physically demanding an occupation is, and the occupational wage percentile. Our measure of employment status indicates if the respondent claimed to not be working at the time of the 1992 survey collection. To measure how physically demanding an occupation is, we use the Dictionary of Occupational Titles (DOT) "Strength" measure from 1991. This measure indicates if a job is sedentary (0) or requires light (1), medium (2), heavy (3), or very heavy (4) levels of strength based how often workers have to stand, walk, sit, lift, carry, push, or pull objects on the job. We matched this strength value to the most recent occupation listed in the 1992 HS&B:So survey. Our measure of occupational wage percentile comes from the 1990 census. We calculated the mean hourly wage for each occupation reported in the 1990 census, computed the percentile of the occupation, and assigned the value to the most recent occupation reported in the 1992 survey.

Background Controls

We control for family social status, gender, race, dropout status, age, school factors, perception of ability, and adolescent health to isolate the relationship between course-taking and health from these possibly confounding variables. Family social status measures include parents' education, family income, father's occupation, home ownership, number of siblings, and family structure. School-level characteristics include school type, course offerings, and school composition measures. School type indicates if a student was sampled from a public, Catholic, or other private school. The course offerings variable comes from principal reports of whether the school offered the highest level of courses across the following subject areas: advanced math (calculus or trigonometry), physics, level 3 in a foreign language, and AP courses. School composition measures include the percentage of black and Hispanic students (from principal reports), the proportion of students with a parent with a Bachelor's degree (calculated by aggregating from the full base year sample of nearly 60,000 sophomores and seniors), and the average test score of sophomores in the school (calculated by aggregating from the base year sample of nearly 30,000 sophomores). Our measure of students' perceptions of their ability to complete college is a three-category variable indicating whether students believe they have the ability to go to college (including "yes, definitely" and "yes, probably"), do not have the ability to complete college (including "I doubt it" and "definitely not"), or are not sure (the reference).

Our measures of adolescent health include disability status, body mass index (BMI), and emotional distress. In the base year and first follow-up, students reported health conditions (learning disability, visual handicap, hearing difficulty, deafness, speech disability, orthopedic handicap, other health impairment, or physical condition) and participation in programs for the educationally or physically handicapped.³ Using these indicators of

disability status, we constructed a categorical variable indicating if a student in the base year or first follow-up claimed to have no disability (the reference), a physical disability, or a learning disability. For weight status, we use BMI, calculated from student reports of height and weight in the base year survey. We took the midpoint of each ordinal indicator of height and weight and divided the student weight in kilograms by their height squared in centimeters. Using the definition of healthy weight status for BMI, we assigned students to two categories: healthy weight (the reference) and overweight. In additional analyses, we separated out students who were obese, and the findings are similar. We measure emotional distress using a question from the base year survey: “During the past month, have you felt so sad, or had so many problems, that you wondered if anything was worthwhile?” We use a categorical indicator of whether the student reported having emotional distress never (the reference), once this month, or more than once this month.

Missing Data

We handled missing data on our independent variables in a number of ways. First, we replaced missing data using other available information when possible. Students missing base year information about family social status were assigned first with information from the first follow-up survey, then with data from the parent report administered during the base year survey. School-level variables with missing data from the principal reports, including percent minority and course offerings, were filled in using aggregated student data from survey responses and transcripts. Any specific occupations that were not matched with physical task demand and wage percentile measures were coded to the mean value for the broad occupation category. Remaining missing data were imputed, resulting in five data sets. Analyses using listwise deletion and constant substitution yield results substantively similar to those based on multiply imputed data.

Analysis Plan

Our analysis investigates how high school course-taking shapes health in midlife and the degree to which the association between coursework and health is attributable to skill development, postsecondary attendance and degree attainment, and occupational characteristics. First, we describe the bivariate relationships between midlife health and the courses taken in high school. Then, we use ordinary least squares (OLS) regression to predict self-reported health and physical functioning in midlife. The first model controls for family, health, school, and academic background factors related to both students’ course-taking patterns and their midlife health. The second through fourth models assess the mediating roles of skill development, postsecondary attendance and degree attainment, and occupational characteristics, respectively.

As described in our Background section, not all students advance to the highest level of coursework for which they are prepared. The last step in our analysis estimates how the distribution of health status for the HS&B:So cohort might shift if underplaced students had

³In the base year, the survey question does not stipulate that the visual handicap is not corrected by glasses, and “no impairment” was not an option in the survey. A higher proportion of students than expected selected these options; thus we do not consider students who chose either of these options in the base year to have a disability (Owings and Stocking 1985). Both of these issues were corrected in the 1982 follow-up survey.

taken the highest level of courses for which they were qualified. Specifically, we estimated a multinomial logistic regression model to predict probabilities for each student's course-taking pattern (ranging from all low to all high) as a function of sophomore year test scores, GPA, and locus of control. We consider students to be underplaced if the course sequence with the greatest predicted probability is more demanding than the course sequence they actually took. To simulate the population distribution of health outcomes if no students were underplaced, we reassign underplaced students to their predicted course sequence and simulate the population distribution of health status and physical functioning in midlife. We present selected results in two graphs (one for each health outcome) that show two aspects of how health distributions might change as a consequence of the simulated course pattern reassignment. First, we display the result of assigning underplaced students who took the lowest level of coursework *out* of the lowest category to instead take their predicted course-taking level. Second, we display how the distribution of midlife health would shift for the highest category of course-taking by reassigning underplaced students who were qualified to be *in* the highest category of course-taking.

In all analyses, we use the appropriate sample weights and clustered standard errors at the school-level to make inferences about the general population of 1980 high school sophomores.

Robustness Checks

We performed a number of additional analyses to test the robustness of our findings. We used alternative measures of course-taking, including measures of the highest level of math, science, and foreign language taken and years of math, science, English, social studies, foreign language, and vocational courses taken. We also used alternative measures of occupation, including occupation in the most recent survey and other measures of occupational characteristics, such as analytic tasks, job control, and involvement with people. We estimated models that included indicators of degrees earned after early adulthood as reported in mid-life. Additionally, we assessed whether health behaviors in early adulthood, including alcohol consumption and visits to the doctor, behave as an additional mechanism between course-taking and health in midlife. Although these health behaviors are significantly related to midlife health, they do not significantly mediate the association between course-taking and health in midlife. We exclude this possible mechanism from our analyses. We also estimated self-reported health status with logistic regression and ordered logistic regression and physical functioning with negative binomial regression models.

To further assess selection into course-taking, we used propensity score matching (PSM) techniques and school fixed effects models. The findings from PSM suggest that taking above a low-level curriculum is significantly positively related to self-reported health status and physical functioning at midlife, even when accounting for differential probabilities of taking higher-level courses. Our school fixed effects models also produced consistent conclusions about the link between course-taking and health in midlife. Although the results are substantively similar across these robustness checks, we report our results as described above because they are the most parsimonious models and they mirror techniques commonly

used with these outcome variables. Findings from any of these alternative specifications are available upon request.

Results

Table 1 shows the relationship between high school course-taking and midlife health. The first few rows of the table display the means and standard deviations for the two health outcomes by our indicator of course-taking. The modal category of course-taking level is mixed-low, only reaching low levels of math, science, or foreign language and taking a few medium-level courses. The smallest share of students take all high-level courses. These course-taking patterns are significantly related to health in midlife; individuals who took all low-level courses have the lowest and individuals who took all high-level courses have the highest self-reported health and physical functioning. The remainder of table 1 shows the gaps in health between course levels. Students who took the highest level of coursework in each subject—advanced math or science, level 3 or above in foreign language, and honors courses—on average report “very good” health status (4 = very good) and above average physical functioning. The gaps in health between those who took high- and low-level courses reflect a possible benefit to high-level course-taking on health in midlife, but selection into course levels may explain part or all of these gaps.

Health Inequalities in Midlife and High School Course-Taking

Tables 2 and 3 present results from OLS regressions predicting self-reported health status and physical functioning at midlife, respectively. In model 1 of table 2, students who took any courses above the lowest category report significantly better health status at midlife. The size of the coefficient increases with each course-taking level, but differences between adjacent levels are not statistically significant. A person who took all high-level courses has on average a 0.218-point higher level of health status than a person who took all low-level courses, a health advantage of more than one-fifth of a standard deviation.

In table 3, the contrast in physical functioning between those who completed all medium-level courses or all high-level courses on the one hand and all low-level courses on the other is statistically significant in model 1. A person taking all high-level courses is expected to have a 0.206 higher level of physical functioning than someone who took all low-level courses, a difference that is more than one-fifth of a standard deviation on the physical functioning scale. The mixed curriculum levels, both low and high, are not significantly associated with better physical functioning compared to a uniformly low-level curriculum, but point estimates are positive.

The findings from models predicting both self-reported health status and physical functioning provide support for our first hypothesis; there is an association between the level of courses taken in high school and health at midlife, even net of the observed attributes associated with the sorting of students into different levels of courses. The size of the coefficient is nontrivial; it is similar to the effect of advanced course-taking on math test score gains found by Gamoran (1992).

Skill Development

Model 2 evaluates our second hypothesis, which concerns the role of skill development during high school as a possible mechanism between high school course-taking and midlife health. Contrary to our expectations, skill development does not significantly mediate the association between course-taking and self-reported health and physical functioning.⁴ Yet, changes in skills are significantly related to midlife health. Shown in table 2, students who experience an increase in GPA and in their internal locus of control between their sophomore and senior years of high school report significantly better health status in midlife. Specifically, a one-point increase in GPA or in locus of control increases health status by 0.093 and 0.144 points, respectively. Shown in table 3, a one-unit increase in students' internal locus of control between sophomore and senior years is associated with 0.192-point higher physical functioning in midlife. These findings suggest that course-taking patterns are related to self-reported health and physical functioning in midlife, independent of students' changes in cognitive and noncognitive skills during the last two years of high school. There is also an association between changes in locus of control during high school and health in midlife.

Postsecondary Attendance and Degree Attainment

Next, we evaluate the role of postsecondary experiences in the association between course-taking and health in midlife in model 3. Here we do find that a significant portion of the association between course-taking and health at midlife operates through postsecondary attendance and degree attainment. In table 2, the coefficient for taking all high-level courses is reduced by 37 percent from model 2, and the contrast between all medium-level courses and all low-level courses is no longer significant. Although students who attended college without receiving a degree or who only received an Associate's degree report significantly better health than those without any college experiences, the biggest jumps in health status come to those who earned Bachelor's degrees. Individuals who received a Bachelor's degree from a selective college have significantly better health in midlife than those who earned a Bachelor's degree from a nonselective college, net of all of our controls.

In table 3, postsecondary experiences attenuate the coefficients for medium-level and high-level course-taking, rendering the association between high-level course-taking and physical functioning nonsignificant. Individuals who attended college but didn't earn a degree report better physical functioning than individuals without any college experience, but individuals who only received an Associate's degree don't report significantly better physical functioning than those without any college experience (although the coefficient is positive). Unlike the results for self-reported health status, receiving a Bachelor's degree from a selective college is not significantly better for one's physical functioning than receiving one from a nonselective college. These findings provide support for hypothesis 3; pathways into postsecondary institutions mediate part of the remaining relationship between course-taking and health in midlife and are associated with midlife health.

⁴We test for significance of the mediation using Stata's causal mediation package (Hicks and Tingley 2011).

Occupational Characteristics

The fourth models in tables 2 and 3 assess the degree to which occupational characteristics mediate the relationship between high school course-taking and health in midlife, and if an independent association between course-taking and midlife health remains when conditioning on occupational characteristics. We find little support for our fourth hypothesis; occupational characteristics in early adulthood do not significantly mediate the association between course-taking and health, net of changes in skills during high school and patterns of postsecondary attendance and completion. In table 2, the coefficient for high-level courses reduces and becomes marginally significant with the inclusion of occupational characteristics, but the association between mixed high-level course-taking and health status remains statistically significant. Individuals in higher-wage occupations on average report better health status, conditioning on all other controls in the model. In table 3, the coefficient for medium-level courses remains only marginally significant, and none of the occupational characteristics is significantly related to physical functioning.

Even in the full model, we observe a significant positive association between taking mixed high-level coursework (compared to all low-level) and self-reported health status in table 2. Although about one-third of this association operates through the three mechanisms we consider, taking some advanced coursework independently predicts better health status in midlife. Sophomore year locus of control and the change in locus of control during the last two years of high school are also positively and significantly related to both self-reported health status and physical functioning in midlife in the final models. In sum, high school course-taking is related to self-reported health and physical functioning in midlife, partially through postsecondary pathways.

Improving the Midlife Health of Underplaced Students

Our observations suggest that course-taking patterns—from taking all low-level courses to taking all high-level courses—are associated with midlife health. Our estimates of course-taking are robust to different model specifications and a host of controls, and the findings are consistent with a causal relationship, but not definitive evidence of one. For the last step in our analysis, we analyze how our estimates of midlife health would change if all students had taken at least the highest level of coursework for which they were prepared, as indicated by their skills. We estimated a multinomial logistic regression predicting students' course-taking level based only on their cognitive and noncognitive skills during sophomore year of high school and calculated the predicted probability of taking each course level, as described in the analytic plan. According to our estimates, about 1,240 individuals in the self-reported health sample and 620 individuals in the physical functioning sample (about 20 percent of the weighted samples) were underplaced in their high school coursework.

Figures 2 and 3 display the estimated distribution of health status and physical functioning for students who took all low-level courses and all high-level courses, with both their observed (shaded) and predicted (lines) course-taking. According to figure 2, individuals who took all low-level courses typically report “good” health, whereas individuals who took all high-level courses typically report “very good” health or better in midlife. Improving the course-taking of underplaced students removes some students from the “good” region and

places some students in the “very good” region. Figure 3 shows a similar pattern for physical functioning. Most of the distribution of physical functioning for students who took all low-level courses is below the overall sample mean (0.97), and most of the distribution of students who took all high-level courses is above the mean. Changing the course-taking of underplaced students predicts improvement in their physical functioning, removing some from the distribution below the original total sample mean and placing some in the distribution above this mean. Overall, based on population estimates from our nationally representative sample, increasing the level of coursework taken for underplaced students moves about 53,000 individuals above the threshold for “very good” health and about 92,000 individuals above the original estimated mean for physical functioning. These findings suggest that encouraging prepared students to take higher-level courses may improve our population’s midlife health if the relationship is causal.

Discussion

Health researchers have long noted that years of education and educational attainment are important for health outcomes. However, how the process of education benefits health is less well understood. In this study, we combined research on health, education, and work to understand how high school course-taking is related to long-term health outcomes. Using the recent HS&B:So mid-life follow-up, we investigated the relationship between high school course-taking and self-reported health and physical functioning over thirty years after high school. We isolated the link between high school coursework and midlife health from factors that predict both the sorting of individuals into high school courses and their midlife health. In addition, we assessed three possible explanations for this link: skill development, postsecondary attendance and degree attainment, and occupational characteristics.

We estimated that the level of coursework students take during high school may have a long-term association with their health at midlife. We find support for our first hypothesis; after controlling for background, adolescent health, baseline skills, and school characteristics, individuals who took medium- to high-level courses report better health status and physical functioning compared to those who only took low-level courses. Our second and fourth hypotheses were not supported; cognitive and noncognitive development during high school and occupational characteristics in early adulthood explain very little of this association. However, part of the link between course-taking and health does operate through postsecondary attendance and degree attainment, lending support to our third hypothesis. Although these mechanisms explain part of the link between course-taking and physical functioning, an estimated effect of self-reported health remains, even with a strong set of controls. These findings raise three major themes for discussion.

Notably, our findings show that people who took all low-level courses in high school are considerably less healthy in midlife, according to our two indicators. At an age when most people are in “very good” health and have few physical task difficulties, those who took exclusively low-level high school courses exhibit signs of accelerated aging, with worse self-reported health and physical functioning. This group represents those who were left behind in high school; they did not take the academic coursework necessary to advance to college and be successful in the labor market. Adolescence is a period when students develop

aspirations and perceptions of the control they have over their lives, which are important for sustaining healthy lifestyle behaviors through early adulthood and midlife (Hitlin and Johnson 2015; Lewis et al. 1999). Students who do not take any advanced academic coursework only acquire basic knowledge and minimal skills, limiting the choices they have in work and life through early adulthood and beyond (Ferrare 2012). Our findings suggest that if students had taken the highest level of coursework for which they were prepared, then the population distribution of health status and physical functioning among individuals who attended high schools in the United States might be better. Perhaps if more students received the academic preparation in middle and elementary school necessary to advance to high-level coursework in high school, then we might have even fewer people with fair or poor health or functional limitations in mid-life. Certainly future research should consider this complex question carefully. What our findings do suggest is that high school course-taking may be a potentially valuable policy lever for improving public health.

The second major theme is about the role of postsecondary attendance and degree attainment as a mechanism linking advanced high school coursework to health. Our findings suggest that taking higher-level courses may place individuals on paths into higher-status positions that benefit their health. Individuals who earn higher-level degrees enter higher social status positions that grant them better access to resources (Collins 1971; Posselt et al. 2012). Similarly, the resources granted to individuals in higher-status positions explain part of the advantages in health by social status (Link and Phelan 1995; Ross and Mirowsky 1999). We found that going to college may benefit health, but receiving a Bachelor's degree, especially a degree from a selective institution, may have even more substantial implications for health, even net of factors that select people into these institutions.

Importantly, even after controlling on factors that contribute to educational attainment and occupation in early adulthood, we find persistent associations between course-taking in high school and self-reported health at midlife. What accounts for the unexplained differences in health across levels of high school academic coursework? Higher-level courses may introduce students to higher-order thinking skills, such as improved problem solving and critical thinking, which are important flexible resources to assist students not only in future educational and labor market endeavors, but also in making everyday decisions that affect health (Link and Phelan 1995). Our supplemental analysis of health behaviors also did not fully account for the relationship between course-taking and health in midlife, but this may be due to the limited measures available in the survey on early adulthood lifestyle behaviors. The long form of the midlife survey does include other indicators of health behaviors. An analysis of these measures was out of the scope of the current study but is worthy of future study. We additionally investigated how much skill development explains the association between course-taking and health, but our measures may be missing out on other ways course-taking impacts skills. The goals teachers have for their students, the instructional strategies students experience, and classroom peer interactions structure student learning and may contribute to skill building. Data on peers and classroom processes have the potential to provide evidence that interactional elements of the schooling process contribute to long-run health outcomes.

Lastly, the results from this study suggest that course-taking patterns during the process of education, and not just the credential at the end, matter for health. Although a few studies have looked at how advantages in the college pipeline during adolescence, such as higher skills and fewer family disadvantages, are related to health (Herd 2010; Schafer et al. 2013; Walsemann, Geronimus, and Gee 2008), most research about health and education measures education through years of schooling or highest degree attained. Our analysis begins to illuminate the underlying mechanisms for these well-documented patterns of mortality and morbidity, but also points to important heterogeneity in health within levels of education associated with curricular opportunities and choices in high school. A long history of research within the sociology of education shows that schooling experiences are unequal, starting as early as preschool, and these inequalities have consequences for skill development, college experiences, and labor market outcomes (Condrón 2009; Iannelli 2013; Pianta et al. 2007). Students who reach the same number of years of schooling and degree levels do so through diverse pathways that depend on family social status, race, gender, place, and health. By bringing together literatures on inequalities in health and schooling, we can better understand what about the process of schooling is important for health and how schools can support positive health outcomes for their students. Our findings suggest that one part of the process of schooling—high school course-taking—may have long-term implications for health.

Our conclusions about the link between high school course-taking and health are limited by the data available to us. The most recent HS&B:So survey only provides self-reported measures of health. Furthermore, around age fifty, members of the HS&B:So cohort are still relatively young, clouding our understanding of long-run effects of educational processes on variation in morbidity and longevity. While not conclusive, our findings are consistent with the idea that taking higher-level courses improves health.

Although we found a link between the level of coursework students take in high school and health in midlife, the causal relationship between course-taking and health remains unclear. Lacking strong instruments, other exogenous shocks to course-taking, or a randomized experiment, which are not available in any nationally representative, longitudinal database for individuals from high school to midlife, we cannot offer definitive evidence on cause. We do our best, however, to build a strong case for this causal relationship by conditioning on well-measured attributes that past literature shows are associated with course-taking and by conducting robustness checks that include propensity score matching and school fixed effects models. We find consistent evidence of the relationship between course-taking and health across a variety of functional forms and specifications. Our findings are consistent with the premise that inequalities in course-taking in high school may have a long-term effect on health. As with all observational studies, we must underscore that we cannot be certain about a causal relationship.

The educational gradient in health is getting steeper (Hayward et al. 2015). Even with new technologies and health information, gaps in health between individuals with and without a college degree remain. We need to have a better understanding about how education contributes to these health disparities to design opportunities for people to be healthy. High school course-taking is just one part of the schooling experience that we found has a

potential long-lasting impact on health. Importantly, it can be molded by local-, state-, and national-level policy. Our results suggest that a more advanced curriculum for all high school students may be part of the solution to eradicating education-based health disparities.

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Appendix

Appendix A. Descriptive Statistics for Both Samples by Self-Reported Health Status and Physical Functioning

			Self-reported health				Physical functioning		
			Mean	SD	Range		Mean	SD	Range
			3.72	(0.98)	1 to 5		0.97	(1.01)	−4 to 1.5
Background		Prop./ mean	Mean/ corr.	SD	Sig	Prop./ mean	Mean/ corr.	SD	Sig
Parents' education	Less than high school	0.13	3.45	(0.94)	***	0.14	0.69	(1.14)	***
	High school	0.34	3.63	(0.94)		0.32	0.92	(0.93)	
	Some college	0.28	3.79	(0.98)		0.28	0.98	(1.05)	
	Bachelor's or above	0.25	3.92	(0.99)		0.26	1.17	(0.84)	

			Self-reported health				Physical functioning		
			Mean	SD	Range		Mean	SD	Range
			3.72	(0.98)	1 to 5		0.97	(1.01)	−4 to 1.5
Background		Prop./mean	Mean/corr.	SD	Sig	Prop./mean	Mean/corr.	SD	Sig
Family income	\$6,999 or less	0.07	3.42	(0.97)	***	0.07	0.59	(1.16)	***
	\$7,000 to 11,999	0.13	3.51	(0.93)		0.14	0.91	(0.91)	
	\$12,000 to 15,999	0.18	3.71	(1.00)		0.17	0.85	(1.07)	
	\$16,000 to 19,999	0.20	3.76	(0.96)		0.21	1.02	(0.93)	
	\$20,000 to 24,999	0.17	3.83	(0.96)		0.17	0.98	(1.04)	
	\$25,000 to 37,999	0.15	3.80	(0.95)		0.15	1.16	(0.86)	
	\$38,000 or more	0.10	3.86	(1.00)		0.09	1.10	(1.00)	
Father's occupation	Other	0.24	3.71	(1.00)		0.24	0.98	(1.03)	***
	Professional/manager	0.30	3.88	(0.98)	***	0.30	1.09	(0.97)	
	Manual	0.46	3.63	(0.94)		0.46	0.88	(0.99)	
Family home	Own	0.80	3.76	(0.97)	***	0.78	1.02	(0.96)	***
	Rent/other	0.20	3.59	(1.00)		0.22	0.80	(1.10)	
Number of siblings	Mean	2.97	−0.05		***	2.97	−0.04		***
	SD	(2.09)				(2.08)			
Live with both parents	Yes	0.72	3.75	(0.98)	***	0.71	1.00	(0.99)	
	No	0.28	3.65	(0.95)		0.29	0.89	(1.03)	
Race	White	0.76	3.78	(0.91)	***	0.77	0.99	(0.93)	***
	Black	0.10	3.48	(0.96)		0.10	0.87	(1.18)	
	Hispanic	0.12	3.58	(1.24)		0.11	0.86	(1.29)	
	Asian	0.01	3.92	(1.53)		0.01	1.28	(0.85)	
	Other	0.01	3.46	(1.32)		0.01	0.70	(1.26)	
Sex	Female	0.52	3.74	(1.01)	*	0.51	0.94	(1.07)	***
	Male	0.48	3.70	(0.94)		0.49	0.99	(0.94)	
Age at baseline	Mean	15.58	−0.11		***	15.58	−0.11		***
	SD	(0.68)				(0.67)			

			Self-reported health				Physical functioning		
			Mean	SD	Range		Mean	SD	Range
			3.72	(0.98)	1 to 5		0.97	(1.01)	−4 to 1.5
Background		Prop./mean	Mean/corr.	SD	Sig	Prop./mean	Mean/corr.	SD	Sig
Dropped out before senior year	No	0.92	3.76	(0.95)	***	0.91	1.01	(0.96)	***
	Yes	0.08	3.29	(1.17)		0.09	0.51	(1.25)	
School-level characteristics									
Type	Public	0.90	3.69	(0.90)	***	0.90	0.95	(0.92)	***
	Catholic	0.07	3.95	(1.57)		0.07	1.17	(1.45)	
	Private	0.03	3.94	(0.95)		0.03	1.03	(1.21)	
% minority students	Mean	16.25	−0.07		***	16.49	−0.05		*
	SD	(24.21)				(24.80)			
% of students with college-educated parent	Mean	0.27	0.13		***	0.28	0.13		***
	SD	(0.18)				(0.19)			
Course offerings in math, science, foreign language, and AP/IB	Don't offer all advanced courses	0.59	3.70	(0.99)	***	0.58	0.97	(1.02)	***
	Offer all advanced courses	0.41	3.84	(0.96)		0.42	1.16	(0.78)	
Average school test scores	Mean	39.80	0.16		***	40.41	0.14		***
	SD	(7.08)				(7.07)			
Baseline skills									
Locus of control	Mean	3.56	0.14		***	3.59	0.15		***
	SD	(0.55)				(0.55)			
Test scores	Mean	39.5	0.19		***	40.04	0.22		***
	SD	(13.88)				(14.07)			
Sophomore GPA	Mean	2.51	0.17		***	2.54	0.18		***
	SD	(0.69)				(0.70)			
Able to complete college	No	0.09	3.41	(0.98)	***	0.09	0.48	(1.25)	***

			Self-reported health				Physical functioning		
			Mean	SD	Range		Mean	SD	Range
			3.72	(0.98)	1 to 5		0.97	(1.01)	−4 to 1.5
Background		Prop./mean	Mean/corr.	SD	Sig	Prop./mean	Mean/corr.	SD	Sig
	Not sure	0.19	3.49	(0.85)		0.18	0.81	(0.90)	
	Yes	0.72	3.83	(0.99)		0.73	1.06	(0.94)	
Adolescent health									
Disability status	No disability	0.73	3.77	(0.98)	***	0.73	1.00	(0.99)	***
	Physical disability	0.17	3.60	(0.95)		0.18	0.94	(0.94)	
	Mental disability	0.10	3.56	(0.95)		0.09	0.70	(1.12)	
Weight status	Healthy weight	0.91	3.76	(0.96)	***	0.90	0.99	(1.00)	***
	Overweight	0.09	3.31	(1.00)		0.10	0.76	(0.98)	
Emotional distress	Never	0.36	3.85	(0.96)	***	0.37	1.06	(0.93)	***
	Once a month	0.32	3.75	(0.95)		0.31	0.97	(1.00)	
	More than once	0.32	3.55	(0.99)		0.32	0.85	(1.07)	
Skill development									
Change in locus of control	Mean	0.16	0.02		***	0.14	0.01		~
	SD	(0.58)				(0.57)			
Change in test scores	Mean	4.38	0.05		**	4.70	0.07		*
	SD	(6.93)				(6.84)			
Change in GPA	Mean	0.06	0.01			0.04	−0.02		
	SD	(0.49)				(0.49)			
Postsecondary experiences									
Delayed entry	No	0.89	3.73	(0.98)	***	0.88	1.00	(0.98)	**
	Yes	0.11	3.65	(0.96)		0.12	0.75	(1.10)	
Attainment by 92	Never attended college	0.29	3.42	(0.90)	***	0.26	0.62	(1.02)	***
	Attended college without earning a degree	0.22	3.73	(0.93)		0.21	1.04	(0.88)	
	Associate's degree	0.20	3.72	(0.97)		0.21	0.87	(1.05)	

		Self-reported health				Physical functioning			
			Mean	SD	Range		Mean	SD	Range
			3.72	(0.98)	1 to 5		0.97	(1.01)	−4 to 1.5
Background		Prop./ mean	Mean/ corr.	SD	Sig	Prop./ mean	Mean/ corr.	SD	Sig
	Bachelor's degree from nonselective school	0.22	3.99	(0.97)		0.24	1.24	(0.79)	
	Bachelor's degree from selective school	0.07	4.16	(0.93)		0.08	1.37	(0.42)	
Occupational characteristics									
Working in 92	No	0.11	3.58	(1.08)	***	0.11	0.68	(1.25)	***
	Yes	0.89	3.74	(0.96)		0.89	1.00	(0.96)	
Physical demands	Mean	1.80	−0.04		**	1.79	−0.01		***
	SD	(0.93)				(0.92)			
Wage percentile rank	Mean	42.56	0.16		***	43.75	0.17		***
	SD	(30.73)				(30.74)			
	<i>n</i>	6,850				2,990			

Note:

*** signifies that the average self-reported health status or physical functioning differs significantly ($p < .001$) across the variable.

Appendix B. Course-Taking Patterns

		Total 1	Low 0.26	Mixed-low 0.39	Medium 0.12	Mixed-high 0.14	High 0.08
Highest level of math	General	0.20	0.56	0.13	0.00	0.02	0.00
	Algebra 1	0.23	0.44	0.26	0.00	0.11	0.00
	Geometry	0.15	0.00	0.26	0.17	0.18	0.00
	Algebra 2	0.24	0.00	0.25	0.46	0.39	0.37
	Advanced	0.18	0.00	0.09	0.37	0.30	0.63
Number of math courses	Mean	3.11	2.3	3.01	3.91	3.53	4.16
	SD	(1.20)	0.84	1.12	1.10	1.17	1.01
Highest level of science	General	0.16	0.34	0.16	0.00	0.04	0.00
	Biology	0.44	0.66	0.60	0.00	0.26	0.00
	Chemistry	0.17	0.00	0.13	0.57	0.35	0.00
	Advanced	0.23	0.00	0.10	0.43	0.35	1.00
Number of science courses	Mean	2.22	1.62	1.90	3.07	2.61	3.70
	SD	(1.10)	0.70	0.86	1.01	1.10	1.12

		Total 1	Low 0.26	Mixed-low 0.39	Medium 0.12	Mixed-high 0.14	High 0.08
Highest level of foreign language	No language course	0.49	1.00	0.49	0.00	0.29	0.00
	Level 1	0.18	0.00	0.29	0.27	0.2	0.00
	Level 2	0.18	0.00	0.14	0.44	0.25	0.45
	Level 3 or above	0.15	0.00	0.08	0.29	0.26	0.55
Number of foreign language courses	Mean	1.02	0.01	0.78	2.14	1.63	2.70
	SD	(1.20)	0.11	0.97	1.14	1.53	1.04
Took honors English	No	0.87	1.00	0.94	1.00	0.54	0.55
	Yes	0.13	0.00	0.06	0.00	0.46	0.45
Number of English courses	Mean	3.85	3.59	3.86	4.08	4.02	4.02
	SD	(1.07)	1.01	1.05	1.02	1.03	1.11
Took honors social studies	No	0.92	0.00	0.95	1.00	0.75	0.74
	Yes	0.08	1.00	0.05	0.00	0.25	0.26
Number of social studies courses	Mean	3.29	3.06	3.32	3.41	3.44	3.35
	SD	(1.19)	1.10	1.17	1.28	1.15	1.18
Took any honors/AP/IB	No	0.73	1.00	0.89	0.99	0.00	0.00
	Yes	0.27	0.00	0.11	0.01	1.00	1.00
	<i>n</i>	6,850	1,310	2,610	1,110	1,090	730

Figure 1.
Conceptual Model

Figure 2. Estimated Population Distribution of Health Status by Course-Taking Pattern

Notes: Figure displays the estimated distribution of health status for two of the course-taking levels from an ordinary least squares regression, controlling for background and baseline skills. “LOW” indicates taking all low-level courses, and “HIGH” indicates taking all high-level courses. The “Observed” lines are health status by the course-taking pattern reported on student transcripts. The “Predicted” lines are health status if all high school students took at least the highest course-taking level that they were prepared to take based on their sophomore year skills. The mean is the population mean from table 1.

Figure 3. Estimated Population Distribution of Physical Functioning by Course-Taking Pattern

Notes: Figure displays the estimated distribution of physical functioning for two of the course-taking levels from an ordinary least squares regression, controlling for background and baseline skills. “LOW” indicates taking all low-level courses, and “HIGH” indicates taking all high-level courses. The “Observed” lines are physical functioning by the course-taking pattern reported on student transcripts. The “Predicted” lines are physical functioning if all high school students took at least the highest course-taking level that they were prepared to take based on their sophomore year skills. The mean is the population mean from table 1.

Table 1

Descriptive Statistics for Midlife Health by High School Course-Taking

	Self-reported health				Physical functioning				
	Proportion	Mean	SD	Sig.	Proportion	Mean	SD	Sig.	
Overall health		3.72	(0.98)			0.97	(1.01)		
High school courses									
Course-taking pattern	All low-level courses	0.26	3.46	(0.87)	***	0.27	0.64	(0.99)	***
	Mixed low-level courses	0.39	3.71	(0.96)		0.38	0.97	(0.93)	
	All medium-level courses	0.12	3.90	(1.02)		0.12	1.24	(0.84)	
	Mixed high-level courses	0.14	3.92	(0.95)		0.15	1.12	(0.92)	
	All high-level courses	0.08	4.05	(0.99)		0.09	1.31	(0.64)	
Highest level of math	General	0.20	3.41	(0.89)	***	0.20	0.58	(1.05)	***
	Algebra 1	0.23	3.60	(0.90)		0.23	0.85	(0.90)	
	Geometry	0.15	3.80	(0.94)		0.15	1.06	(0.94)	
	Algebra 2	0.24	3.88	(1.00)		0.23	1.14	(0.89)	
	Advanced	0.18	3.96	(0.99)		0.19	1.23	(0.77)	
Highest level of science	General	0.16	3.51	(0.87)	***	0.15	0.59	(1.13)	***
	Biology	0.44	3.65	(0.96)		0.44	0.91	(0.94)	
	Chemistry	0.17	3.89	(0.97)		0.17	1.14	(0.92)	
	Advanced	0.23	3.92	(1.01)		0.24	1.19	(0.85)	
Highest level of foreign language	No language course	0.49	3.58	(0.89)	***	0.50	0.81	(0.97)	***
	Level 1	0.18	3.73	(0.97)		0.18	1.00	(0.91)	

	Self-reported health			Physical functioning		
	Proportion	Mean	SD	Sig.	Mean	Sig.
Level 2	0.18	3.85	(1.02)		1.18	(0.92)
Level 3 or above	0.15	4.05	(1.02)		1.21	(0.88)
Took an honors/AP/IB Course						
No	0.73	3.65	(0.97)	***	0.90	(1.02)
Yes	0.27	3.92	(0.97)		1.14	(0.89)
<i>n</i>	6,850				2,990	

Note:

*** signifies that the average self-reported health status or physical functioning differs significantly ($p < .001$) across course-taking categories.
AP: Advanced Placement; IB: International Baccalaureate.

Table 2

OLS Regression Coefficients Predicting Self-reported Health Status at Midlife

	Models			
	(1)	(2)	(3)	(4)
Course-taking pattern				
[ref. All low-level courses]				
Mixed low-level courses	0.106* (0.047)	0.103* (0.047)	0.085~ (0.047)	0.082~ (0.047)
All medium-level courses	0.140* (0.061)	0.144* (0.061)	0.087 (0.061)	0.080 (0.061)
Mixed high-level courses	0.190*** (0.058)	0.184*** (0.058)	0.134* (0.057)	0.129* (0.058)
All high-level courses	0.218** (0.068)	0.223*** (0.068)	0.140* (0.069)	0.130~ (0.069)
Baseline skills				
Locus of control	0.083** (0.032)	0.178*** (0.038)	0.179*** (0.038)	0.181*** (0.038)
Test scores	-0.002 (0.002)	-0.004* (0.002)	-0.006** (0.002)	-0.006** (0.002)
GPA	0.075** (0.028)	0.112*** (0.030)	0.078* (0.031)	0.073* (0.031)
Skill development				
Change in locus of control		0.144*** (0.032)	0.142*** (0.032)	0.143*** (0.032)
Change in test scores		-0.002 (0.002)	-0.004 (0.002)	-0.004 (0.002)
Change in GPA		0.093** (0.033)	0.070* (0.033)	0.065~ (0.033)
Postsecondary attendance and degree attainment [ref. No college]				
Some college			0.167** (0.049)	0.164** (0.050)
Associate's			0.177*** (0.049)	0.169*** (0.049)
Bachelor's (nonselective)			0.291*** (0.054)	0.271*** (0.055)
Bachelor's (selective)			0.405*** (0.069)	0.386*** (0.070)
Delayed enrollment [ref. No]			-0.059 (0.057)	-0.062 (0.057)
Occupational characteristics [ref. Working]				
Not working				0.022 (0.078)
Physical demands				0.017 (0.025)
Wage percentile				0.002* (0.001)
Constant	3.547*** (0.471)	3.105*** (0.477)	3.081*** (0.475)	3.018*** (0.480)
R ²	0.100	0.107	0.115	0.117

Note: All models control for race, gender, adolescent health, family background, dropout status, and school-level characteristics ($n = 6,850$). OLS: ordinary least squares.

 $p < .001$

$r > d_{\sim}$
 $50 > d_{*}$
 $10 > d_{**}$

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OLS Regression Coefficients Predicting Physical Functioning at Midlife

	Models			
	(1)	(2)	(3)	(4)
Course-taking pattern				
[ref. All low-level courses]				
Mixed low-level courses	0.134 (0.091)	0.128 (0.089)	0.101 (0.089)	0.093 (0.088)
All medium-level courses	0.261 ^{**} (0.099)	0.261 ^{**} (0.097)	0.189 [~] (0.097)	0.177 [~] (0.096)
Mixed high-level courses	0.136 (0.101)	0.123 (0.101)	0.061 (0.101)	0.044 (0.101)
All high-level courses	0.206 [*] (0.104)	0.204 [*] (0.103)	0.121 (0.102)	0.106 (0.102)
Baseline skills				
Locus of control	0.083 (0.058)	0.207 ^{**} (0.067)	0.207 ^{**} (0.067)	0.206 ^{**} (0.067)
Test scores	0.004 (0.003)	0.002 (0.003)	-0.000 (0.003)	-0.000 (0.003)
GPA	0.099 [*] (0.049)	0.107 [*] (0.053)	0.079 (0.052)	0.069 (0.052)
Skill development				
Change in locus of control		0.192 ^{**} (0.071)	0.192 ^{**} (0.070)	0.192 ^{**} (0.070)
Change in test scores		-0.001 (0.004)	-0.003 (0.004)	-0.003 (0.004)
Change in GPA		0.008 (0.059)	-0.005 (0.059)	-0.012 (0.060)
Postsecondary attendance and degree attainment [ref. No college]				
Some college			0.321 ^{***} (0.094)	0.305 ^{**} (0.095)
Associate's				
			0.177 [~] (0.095)	0.166 [~] (0.096)
Bachelor's (nonselective)			0.335 ^{***} (0.089)	0.295 ^{**} (0.092)
Bachelor's (selective)			0.388 ^{***} (0.094)	0.360 ^{***} (0.097)
Delayed enrollment [ref. No]			-0.239 [*] (0.111)	-0.240 [*] (0.111)
Occupational characteristics [ref. Working]				
Not working				-0.219 (0.137)
Physical demands				-0.047 (0.042)
Wage percentile				0.001 (0.001)
Constant				
	-0.057 (0.764)	-0.527 (0.805)	-0.670 (0.806)	-0.599 (0.816)
R ²	0.103	0.111	0.125	0.129

Note: All models control for race, gender, adolescent health, family background, dropout status and school-level characteristics ($n = 2,990$). OLS: ordinary least squares.

 $p < .001$

$r > d_{\sim}$
 $50 > d_{*}$
 $10 > d_{**}$

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