

Underrepresented Minorities in High School Physics

Results from the 2012-13 Nationwide Survey of High School Physics Teachers

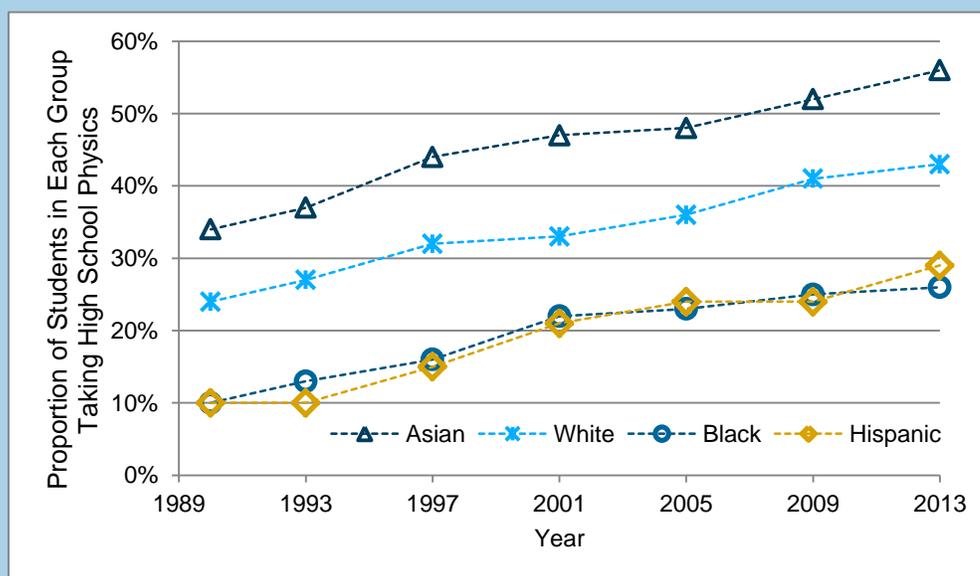
Susan White and John Tyler

A Vast Discrepancy Remains

As shown in **Figure 1**, Hispanic and Black participation in high school physics has consistently been lower than that of Whites and Asians. This phenomenon is not limited to high school physics; Hispanics and African Americans are underrepresented among physics degree recipients at every level. [See *focus on Trends in Exiting Physics Master's*, *focus on Trends in Physics PhDs*, and *focus on Physics Bachelor's Degrees*.]

Figure 1

Proportion of Students Taking High School Physics in the US in Each Racial/Ethnic Group



www.aip.org/statistics

In this report, we use data from our 2012-13 Nationwide Survey of High School Physics Teachers to examine the relationship between socioeconomic status, race/ethnicity, and physics offerings. The data suggest that socioeconomic status may have more of an impact on the physics-taking rate (defined as the proportion of students in a group who take physics) than racial/ethnic differences. However, we must note that factors other than socioeconomic status can affect whether or not a student takes physics in

REPORTS ON HIGH SCHOOL PHYSICS

Textbooks,
Resources and
Teacher
Resourcefulness
(7/2014)

Who Teaches High
School Physics?
(11/2014)

High School Physics
Teacher Breakdown
(11/2014)

**Underrepresented
Minorities in High
School Physics
(6/2015)**

THE 2012-13 NATIONWIDE SURVEY OF HIGH SCHOOL PHYSICS TEACHERS

During the 2012-13 academic year, we collected data from a representative national sample* of over 3,500 public and private high schools across the U.S. to inquire about physics availabilities and offerings. This and future reports describe our findings.

*Excluding Hawaii

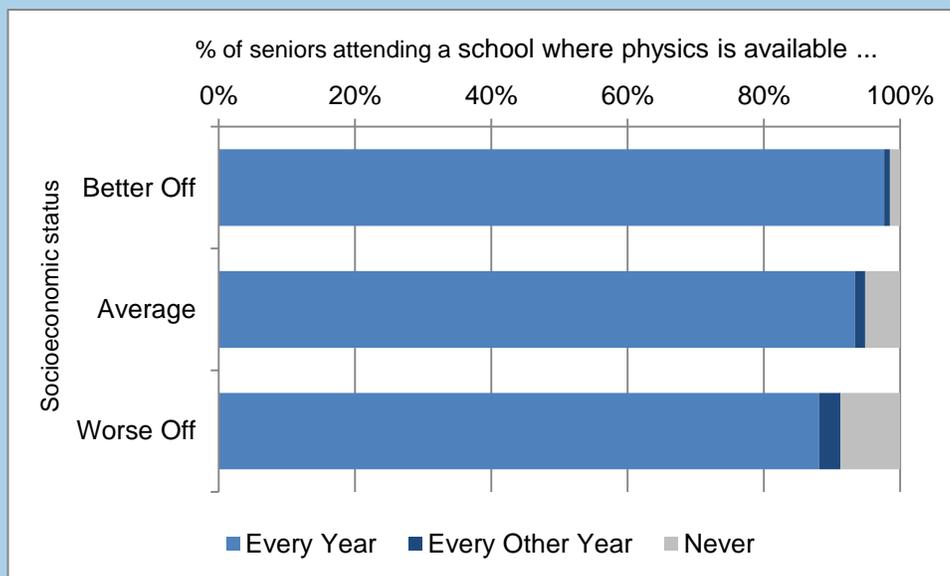
high school. We have school-level data on socioeconomics, so we will examine the impact of socioeconomics on physics taking by race/ethnicity.

Socioeconomic Status of US High Schools

The proportion of students receiving free or reduced-price lunches is often used as a measure of the socioeconomic status of a school. We found that this measure does well at distinguishing schools at the lower end of the socioeconomic scale; however, it does not distinguish between average and well off schools. So, we began asking our principals to assess the economic situation of their students relative to others in the area in 1997. We have found that this measure is consistent with the free and reduced-price lunches on the lower end of the spectrum (worse off); furthermore, it allows us to distinguish between average and better off schools.

Figure 2

How Often Physics is Offered By Socioeconomic Status* US Public High Schools Only, 2012-13



* Principal/teacher assessment of student economic circumstances relative to those of students at other schools in the local area.

www.aip.org/statistics

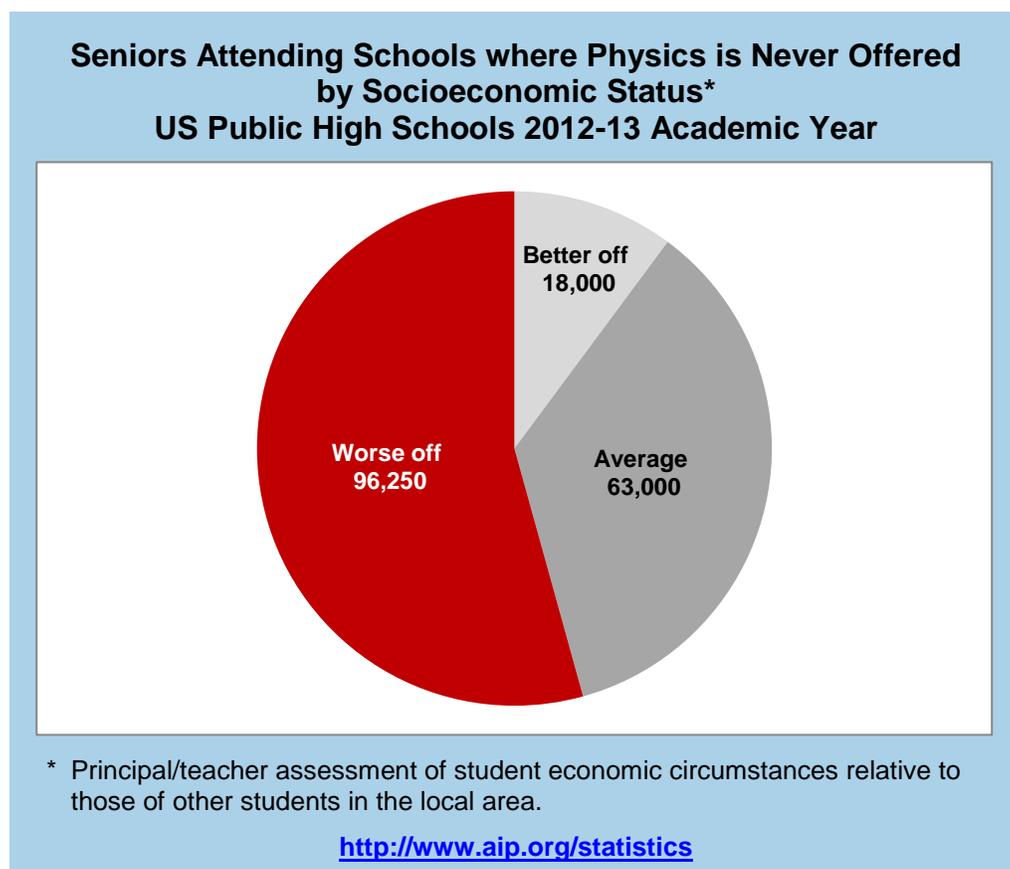
The vast majority of seniors attend a school which offers physics every year; however, as the economic status of the school decreases so does the proportion of the seniors attending a school offering physics every year.

Based on principals' responses, we classify our schools into three socioeconomic groups: worse off, average, and better off. About one-third of seniors and one-thirds of teachers who teach at least one physics class are at each type of school. However, physics offerings differ dramatically by the socioeconomic profile of the school.

As we can see in **Figure 2** (previous page), almost every senior in a better off school has the opportunity to take physics because physics at better off schools is almost always offered every year or every other year. However, the proportion of seniors attending a school where physics is not offered (the gray portion) increases as the socioeconomic status decreases. Thus, a higher proportion of seniors at worse off schools will attend a school where physics is never offered. (Note that we examine proportion of *seniors* at schools – not the proportion of schools – because, even though smaller schools are less likely to offer physics, this impacts a very small proportion of seniors.)

In **Figure 3** (below), we display this discrepancy in physics offerings another way. From the figure, we can see that about 96,250 students attending worse off schools will not be able to take physics classes. Those students attending worse off schools make up well over half of the total number of students that will not have physics classes available to them. Only 18,000 of those students attending better off schools will not have the opportunity to take physics classes, about 10% of the total who will not attend an institution where physics is offered.

Figure 3

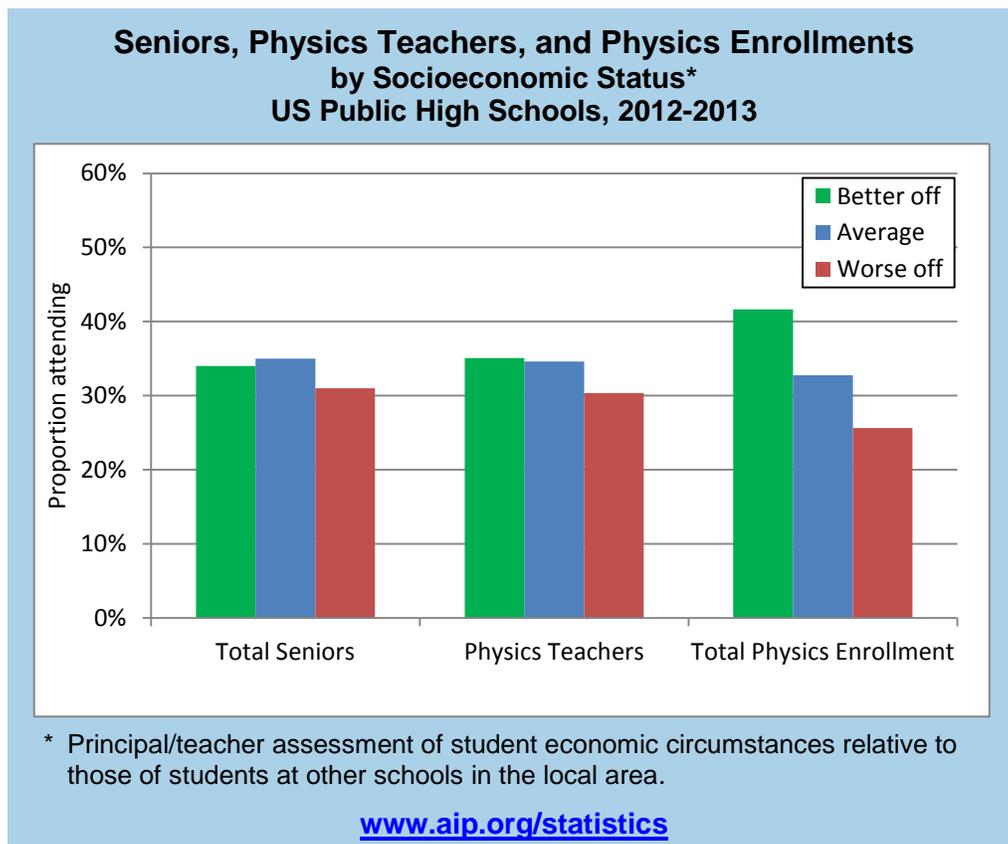


Well over half of the seniors attending schools where physics is not offered at all are at worse off schools.

High Schools Physics and Socioeconomic Status

In **Figure 4**, we display the proportion of seniors enrolled, the proportion of physics teachers, and the proportion of total physics enrollments by the socioeconomic status of the school.

Figure 4



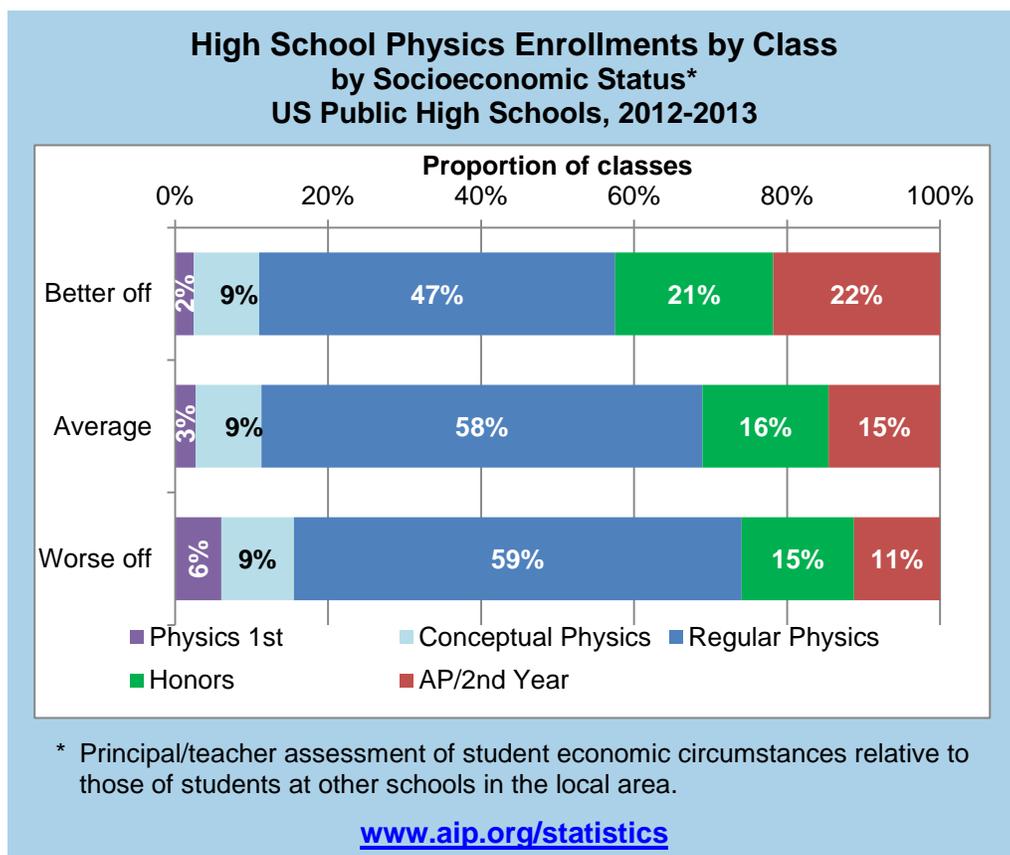
About one-third of seniors and of physics teachers are in each type of school; this is not true of physics enrollments.

Roughly one-third of the seniors are in each of the three classifications, and roughly one-third of the physics teachers are, too. However, total physics enrollment varies dramatically by socioeconomic status. More students at better off schools take physics, and physics taking becomes more routine. Furthermore, since physics enrollments are higher at the better off schools, teachers there teach more physics classes than their counterparts at worse off schools.

Class Types and Socioeconomic Status

In **Figure 5**, we take a closer look into the proportions of physics classes that are taught by schools of differing socioeconomic statuses. About one-fourth of the physics students attending a worse off school are enrolled in honors, Advanced Placement[®] (AP), or second-year physics classes. About one-third of the physics students at average schools and more than 40% of the physics students at better off schools are enrolled in these advanced physics classes.

Figure 5



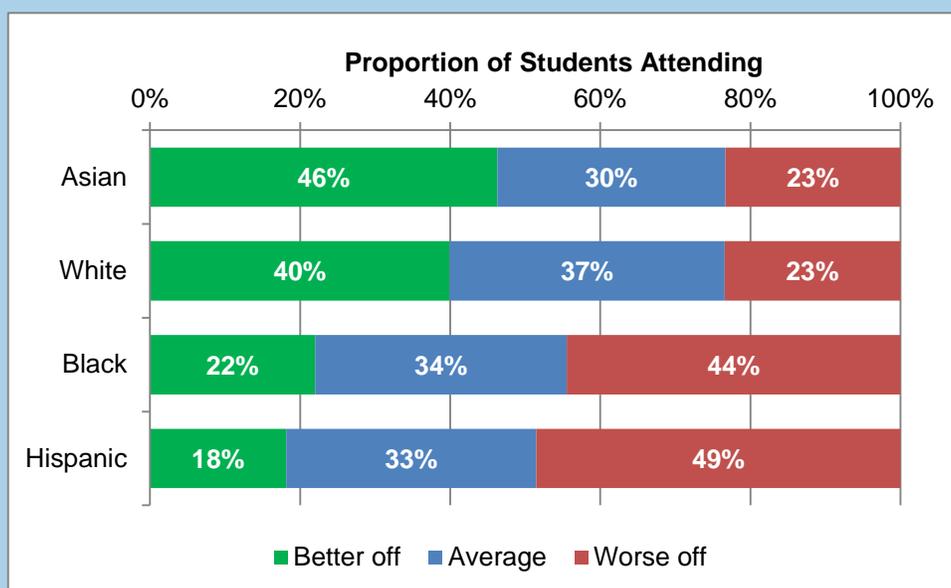
As the socioeconomic status increases, the proportion of students enrolled in higher-level physics classes increases.

Race and Socioeconomic Status in US Public High Schools

Figure 6 presents data for socioeconomic status of one's high school by racial and ethnic groups. Almost half of Asian seniors attended a school assessed by the principal as having students better off than average. Hispanics and Blacks are least likely to attend a better off school, and they are twice as likely to attend a school in which students were characterized as "worse off" by their principals.

Figure 6

**Proportion of Seniors Attending Schools
by Race/Ethnicity and Socioeconomic Status of School*
US Public High Schools Only, 2012-13**



* Principal/teacher assessment of student economic circumstances relative to those of students at other schools in the local area.

www.aip.org/statistics

Almost 50% of Black and Hispanic seniors went to schools where the student body was assessed as "worse off" economically when compared to their peers in the area; this is true of less than 30% of Asian or White seniors.

Given the data in Figures 2, 3, 4, and 5 – which show that physics classes vary by socioeconomic status of the school – and the data in Figure 6 (above), one can see that socioeconomic status explains at least some of the variation in high school physics-taking rate by race/ethnicity.

Survey Methodology

This study is based on a sample of one sixth of the public and private high schools in the U.S. Data collection for this round began in the fall of 2012. Although in past years we began the study by surveying all of the schools in our sample, we changed our methodology this round in order to lower the burden on high schools in our sample, many of which are already heavily surveyed. We began with web searches for each of the 3,858 schools in our sample. If we could identify a physics teacher at the school, we collected the contact information for that teacher. If not, we collected contact information for the principal or science chair. We then contacted each of the schools where we had not identified a physics teacher by phone and e-mail to determine whether or not physics was offered at the school and, if so, who taught it. We collected data on whether or not physics was offered from 3,553 of our 3,858 sampled schools (92%). We compared demographics for the non-responding schools with those of the responding schools and found no evidence to suggest that the two groups differ significantly. Thus, we believe we have a representative sample of schools.

During the spring of 2013, we contacted each of the 3,702 teachers we had identified in the fall to learn more about physics in each of the high schools. We heard back from 56% of the teachers.

Without the help of the principals, teachers, and staff at our sampled schools, we could not provide this information. We offer a sincere thanks to each of you.

e-Updates

You can sign up to receive e-mail alerts which notify you when we post a new report. Visit http://www.aip.org/statistics/e_updates to sign up. You can indicate your area(s) of interest; we will send you an e-Update only when we post a new report that includes data of interest to you. If you sign up for every possible notification, you should receive no more than twenty messages in a year