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A Survey of Research on Post-secondary Outcomes for Advanced Placement Students

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Summary

There is a large body of research on the success of Advanced Placement (AP) students who enroll in post-secondary institutions. Some of it points to better outcomes for students who enter a college or university with AP credit; however, research published by the College Board is among the most frequently cited and this organization has a strong interest in promoting the AP program. This document provides a brief overview of research related to AP and student outcomes. It is not an exhaustive review of the literature on this topic, but it provides a balanced view of the research by referencing College Board studies as well as independent research studies.

The review of the literature reveals varied findings regarding the impact of AP on student outcomes. It has been reported that AP students have higher retention and completion rates and higher GPAs than students who have no AP experience; however, when researchers control for academic ability and socioeconomic characteristics, the results are less conclusive. Also, when better outcomes for AP students are found, the differences are sometimes minimal or significant for only a small number of students (e.g. students with a large number of AP credits). There are also many questions that are largely unanswered, which adds to the lack of certainty about how well AP students perform in college.

Introduction

There is an extensive body of research on the success of Advanced Placement (AP) students who enroll in post-secondary institutions. AP proponents often claim that students who receive AP credit fare better than other students in terms of grade point average, retention, graduation, and time to degree. However, research published by the College Board is among the most frequently cited. This organization has a strong interest in promoting the AP program, as it generates millions in revenue by administering AP exams.

The College Board publications consistently report positive outcomes for AP students. While these studies should not be automatically dismissed, a more inclusive review of the literature offers a less definitive picture of student success. This brief provides an overview of research related to AP and student outcomes. It is not an exhaustive review of the literature on this topic, but it provides a more balanced view of the research by referencing College Board studies as well as independent research studies.

Relationship between AP and GPA

Several studies have found that AP students generally have higher grade point averages than other students. Hargrove et al. (2008) examined college outcomes for AP and non-AP students in Texas public institutions and found that AP students who had completed the course and exam had higher first- and fourth-year GPAs than other students even when controlling for SAT scores and family income. Eimers and Mullen (2003) had similar results from their study of Missouri students. They found that when holding student ability constant, students entering with AP credit had slightly higher first-year GPAs than other students. An analysis of first year GPA of Colorado State University Students (Schneider, 2010) found that across all AP exams, new undergraduates who received a passing AP score (3 or higher, as defined by the College Board) had higher first year GPAs than new students with no AP credit, but this study did not control for student academic ability.

Other studies have not supported the conclusion that AP participation is related to higher GPA. Klopfenstein and Thomas (2005) and Duffy (2010) both found that when controlling for background variables, including academic achievement, differences in GPA were insignificant.

Relationship between AP and Retention and Completion

Increased retention and completion rates are often cited as benefits of AP participation. Eimers and Mullen (2003) found that students entering University of Missouri institutions with AP credits had higher first-year retention rates than other students. Morgan and Klaric (2007) examined outcomes for students entering 27 different institutions in 1994 and determined that AP students had higher completion rates than other students, even when accounting for the higher SAT scores of AP participants. Hargrove, et al. (2008) also found that AP students graduated at consistently higher rates.

Again, the results from other studies conflict with these findings. Delicath (1999) found no impact on first-year retention in his study of St. Louis University students. Klopfenstein and Thomas (2005) and Duffy (2010) found that retention rates for AP students were no higher when student background was taken into consideration. Duffy found the same to be true for graduation rates.

Relationship between AP and Time to Degree

Because students can enter college with credit earned, AP is often presented as a way to accelerate time to degree and lower costs for students. Research generally does not support this claim. Klopfenstein (2010) examined the impact of AP on time to degree for more than 28,000 Texas students and found no evidence that passing an AP course leads to faster graduation. Only a small number of students graduated early – those who attended high schools with a wide array of AP course offerings and adequate support to allow students to pass multiple AP exams. For the typical student, passing an AP exam did not increase the likelihood of graduating in four or five years.

Eykamp (2006) reached a similar conclusion based on his study of more than 15,000 University of California students. He found no clear relationship between time to degree and the number of AP or other college credits earned prior to enrollment. He determined that many students took lighter course loads or graduated with more credits than needed. Eykamp found that students with a large number of AP credits did graduate in slightly less time, but the return was minimal – two quarter's worth of AP units was associated with half a quarter less time enrolled. The average time to degree still exceeded four years.

Delicath's (1999) study of St. Louis University students found no impact on time to degree when controlling for student background. In a review of students who enrolled in Binghamton University with 12 or more AP credits, Cusker (2000) did find that the four-year completion rates for AP students exceeded the four-year rate for other students, but when addressing the issue of timelier completion, she notes that "despite more than 40 years of AP history, the evidence is sporadic and unconvincing."

Relationship between AP and Course Grades

Some research has focused more directly on how students perform in subsequent courses when they receive advanced placement based on their AP exam score. Studies published by the College Board have determined that AP students generally receive higher grades in the second-level course than students who completed the introductory course at the institution, even when controlling for academic ability (Morgan & Ramist, 1998; Morgan & Klaric, 2007). In the earlier study (Morgan & Ramist, 1998), the finding generally held for students who scored 3 on the AP exam (although grades were higher for students who scored 4 or 5). In the minority of cases where grades were lower for AP students, the differences were small. In the latter study (Morgan & Klaric, 2007), the results showed more variation for students who scored lower on the AP exam. For students with a score of 3, the difference between AP and non-AP student grades was minimal and insignificant for most of the exams, indicating that the higher overall performance was primarily attributable to the students with AP scores greater than 3.

Sadler and Sonnert (2010) examined course performance in the sciences for students who passed the AP exam, but still took the introductory course in college (either by choice or because the institution required a higher score). They found that the AP students generally had higher grades in the introductory course, but that their grades (B to B+ average) were not as high as might be expected given that they were essentially repeating the course.

Schneider (2010) examined how Colorado State University students performed in a subsequent math course based on whether they earned credit for the prior course by taking the course at CSU, at another institution, or by passing an AP exam. More than one-third (36.4%) of students who received credit based on an AP exam score of 3 received a grade of D, F, or W in the subsequent course. Students who took the introductory course at CSU had a similar failure/withdrawal rate as students who received credit based on an AP exam score of 3, which suggests students with the minimum passing score were about as well prepared as other students. However, students with

scores of 4 or 5 performed significantly better in the subsequent course. For students with an AP exam score of 4, the percentage of students failing or withdrawing from the subsequent course was 25.4 percent. The percentage dropped to 11.0 percent for students who earned a 5 on the AP exam.

Discussion

This review of the literature reveals varied findings regarding the impact of AP on student outcomes. It has been reported that AP students have higher retention and completion rates and higher GPAs than students who have no AP experience; however, when researchers control for academic ability and socioeconomic characteristics, the results are less conclusive. Also, when better outcomes for AP students are found, the differences are sometimes minimal or significant for only a small number of students (e.g. students with a large number of AP credits).

There are also many questions that are largely unanswered, which adds to the lack of certainty about how well AP students perform in college. Relatively few studies have examined whether outcomes vary for students who pass the AP exam with a score of 3 (claimed equivalent to a B-, C+, or C) versus a higher score. There is no understanding of the impact of awarding students AP credit for elective or general education courses versus courses required for their major. Nor does the research indicate whether AP student outcomes differ depending on the level of selectivity of the receiving institution. It is possible that differences could be lost in data aggregation. Generalized findings might not apply to individual students taking specific courses at specific institutions.

The inconsistent conclusions about AP may, in fact, reflect reality, as the experiences of AP participants might vary substantially based on a number of factors. The research does not indicate that AP students are *disadvantaged* in their post-secondary work; however some questions remain unanswered and positive impacts should not be overstated.

Annotated Bibliography

Sadler, P.M. & Sonnert, G. (2010). High School Advanced Placement and Success in College Coursework in the Sciences. In P.M. Sadler, G.S. Sonnert, R.H. Tai, & K. Klopfenstein (Eds.), AP: A Critical Examination of the Advanced Placement Program (119-137). Cambridge, MA: Harvard Education Press.

Sadler and Sonnert examined evidence for the equivalence of AP coursework in the sciences and performance in *introductory* college science courses. They relied on survey data from students in 124 different first-semester introductory college biology, chemistry, and physics courses in 55 randomly selected colleges and universities to examine student performance in these courses. They formed six cohorts: 1) no high school course; 2) high school course but not AP or honors level; 3) high school honors course; 4) AP student with failing scores; 5) AP students who didn't take the exam; 6) AP students with passing scores (3 or higher).

Sadler and Sonnet found that students who reported passing their AP exam earned grades that were, in most cases, significantly higher than those of students with other experiences. However, even the grades earned by AP exam passers only averaged B to B+ after taking what was essentially their second introductory college level class.

Duffy, W. (2010). Persistence and Performance at a Four-year University. In P.M. Sadler, G.S. Sonnert, R.H. Tai, & K. Klopfenstein (Eds.), AP: A Critical Examination of the Advanced Placement Program (139-163). Cambridge, MA: Harvard Education Press.

Duffy studied 786 first-time, full-time freshmen enrolling at the University of Tennessee at Martin (a moderately selective four-year institution) between fall 2000 and fall 2006. He examined differences in persistence, degree completion, first-year GPA and cumulative GPA. The study included 300 students with no college credit, 181 students with AP credit, and 305 students with other college credit. Independent variables included income, parent education, ACT score, high school rank, race, gender, and student type (no credit, AP credit, other credit).

In all cases, the AP group had greater persistence and performance than the control group and total population, but when background variables were accounted for, the differences were insignificant.

Klopfenstein, K. (2010). Does the Advanced Placement Program Save Taxpayers Money? In P.M. Sadler, G.S. Sonnert, R.H. Tai, & K. Klopfenstein (Eds.), AP: A Critical Examination of the Advanced Placement Program (189-218). Cambridge, MA: Harvard Education Press.

Klopfenstein examined the impact of AP experience on how long it takes students to earn a baccalaureate degree, using a sample of 28,702 students from Texas public universities. She compared students who passed an AP exam to students without AP experience; the study did not identify whether credits were awarded for all passing scores. She used the time to degree analysis to explore the cost-benefit of state subsidies to AP programs.

Klopfenstein found no evidence that AP courses lead to faster graduation. She determined that passing AP exams increases the likelihood of graduating in three years for only a small number of students who attended high schools offering a wide array of AP courses and who have the support necessary to pass multiple AP exams. She concluded that passing AP exams does not increase the likelihood of graduating in four years for the typical student or in five years for those who have not graduated in four years. As a result, Klopfenstein contends that subsidies to AP programs are not justified based on the idea that AP experience shortens time to degree. Klopfenstein noted that the

findings are consistent with the idea that most AP students would do well in college even without AP experience.

Klopfenstein, K. & Thomas, K. M. (2005). The Advanced Placement Performance Advantage: Fact or Fiction? Paper presented at the American Economic Association 2005 Annual Meeting. Retrieved from: https://www.aeaweb.org/assa/2005/0108_1015_0302.pdf

Klopfenstein and Thomas examined the effect of AP courses on first-year persistence and first semester GPA. Their sample consisted of more than 28,000 Texas high school graduates who attended 31 four-year Texas public universities in the fall of 1999. The study was based on students who passed AP exams, but did not identify whether credits were awarded for all passing scores.

The researchers concluded that “after controlling for the balance of a student’s high school curriculum, family, and school characteristics, AP students are generally no more likely than non-AP students to return for a second year of college or to have higher first semester grade point averages.” They noted that the results might be partly due to the expansion of the AP program since 1990 which may have impacted program quality.

Schneider, J. (2014). Advanced Placement Analysis. Colorado State University Office of Institutional Research.

An analysis conducted by Jennifer Schneider Colorado State University (CSU) examined first year GPA to determine whether it differed based on AP exam scores. The population included full-time undergraduates enrolling at CSU between Fall 2007 and Fall 2012 and full-time undergraduate transfer students with a first-year GPA who were enrolled during the same time period. Schneider found that across all AP exams, new undergraduates who received an AP score of a 3, 4, or 5 had significantly higher first year GPA than new students who no AP credit. However, she also determined that in seven content areas, new students with higher AP exam scores (4 versus 3 and 5 versus 4) had higher first year GPAs.

Schneider also examined how students performed in a subsequent math course (MATH 161) based on whether they earned credit for the prior course (MATH 160) by taking the course at CSU, at another institution, or by passing an AP exam. More than one-third (36.4%) of students who received credit based on an AP exam score of 3 received a grade of D, F, or W in the subsequent course. Students who took the introductory course at CSU had a similar failure/withdrawal rate, which suggests students with the minimum passing score were about as well prepared as other students. Students with scores of 4 or 5 performed significantly better in the subsequent course. For students with an AP exam score of 4, this percentage of students failing or withdrawing from the subsequent course was 25.4 percent. The percentage dropped to 11.0 percent for students who earned a 5 on the AP exam.

Eykamp, P.W. (2006). Using data mining to explore which students use advanced placement to reduce time to degree. *New Directions for Institutional Research*, 131, 83–99.

Eykamp examined a cohort of University of California students to determine the effect of AP credits on time to degree, course load, and propensity for students to double major. The study population included 15,667 first-time freshmen entering a UC system campus in 1994. Sixty percent of those students had AP or other university credit when they enrolled. Eykamp converted those credits to course equivalents for the purposes of the study; 25% had two or fewer course equivalents, but more than 25% had enough units to replace at least a quarter of coursework.

Eykamp found no clear relationship between time to degree and the number of AP and other college credits earned. Some students did use AP credits to substitute for university coursework, but it was also determined that 70% of students did not need the credits because they earned the required university credits without including the AP credits.

The study did reveal that students with a large number of AP units tend to enroll for slightly fewer quarters than those with fewer AP units, but two quarter's worth of units was associated with only half a quarter less time enrolled and the average still exceeded four years. Only a small percentage of students with more than 51 AP units graduated in less than four years. Students with AP credits showed no greater likelihood to graduate with high-unit majors or double majors.

Eykamp concluded that only about a third of UC students used AP units to graduate, and many of them took a slightly lighter course load as a way of using them.

Delicath, T. (1999). The influence of dual credit programs on college students' integration and goal attainment. *Journal of College Student Retention*, 1(4), 377-398.

Delicath sought to identify differences in first-year persistence and six-year graduation for students with credits earned through the Advanced College Credit Program (ACC) or Advance Placement (AP) program versus those without ACC/AP credits. He conducted a cohort longitudinal study of 2,760 first-time, undergraduate students who enrolled at St. Louis University between the fall of 1989 and the fall of 1991. Of the students included in the study, 644 had an average of 11.62 ACC credits and 6.11 AP credits.

Initial regression models showed a correlation between ACC/AP credits and time to degree, but the relationship did not hold when controlling for the student's level of academic achievement using ACT scores. Delicath concluded that ACC/AP credits did not significantly influence students' time to graduation.

Eimers, M.T. & Mullen, R. (2003). Dual Credit and Advanced Placement: Do They Help Prepare Students for Success in College? Paper presented at the 43rd Annual Conference of the Association of Institutional Research. Retrieved from: <https://uminfopoint.umsystem.edu/media/fa/planning/students/dualcreditpaperair.pdf>

Eimers and Mullen studied 7,913 first-time degree-seeking resident freshmen who enrolled in one of four University of Missouri System campuses within one year of high school graduation. They examined whether there were differences in first-year GPA and first-year retention between students who received AP or dual credit versus students who did not. They controlled for academic ability using ACT scores, high school rank, and completion of Missouri's high school core curriculum.

The researchers found when holding student ability constant, students entering with AP credit tended to have slightly higher GPAs than students entering with dual credit only or those entering with no credit. Students entering with AP credit or dual credit both had higher retention rates.

Morgan, R. & Ramist, L. (1998) Advanced Placement Students in College: An Investigation of Course Grades at 21 Colleges. Report No. SR-98-13. Educational Testing Service. Retrieved from: <http://www.collegeboard.com/ap/pdf/validity2.pdf>

Morgan and Ramist compared performance in upper level courses of those who received advanced placement based on AP exam scores with performance of students who took introductory college

courses. They received data from 21 institutions, including several highly selective institutions. The data file included information on 66,125 students; 27,268 records had a least one AP grade.

Students who scored 5 on AP exams generally performed better in the subsequent course than students who scored 4, and students who scored 4 generally outperformed students who scored a 3. However, in most cases, students who scored 3 on the AP exam and were placed directly into the second-level course performed better than students who took the introductory course in college. Where grades were lower for AP students, the difference was minimal.

Cusker, E.R. (2000). A Study of the Use of Advanced Placement Credit by Undergraduates Entering Binghamton University in 1990. Learning Productivity Network Newsletter. Retrieved from: <http://gse.buffalo.edu/org/lpn/news/cusker.html>

Cusker conducted a case study of students who entered Binghamton University in 1990 with 12 or more AP credits. She examined how students used AP credits toward their degrees. Cusker found: 1) 30% completed more ambitious programs including double majors or degrees and minors; 2) over 90% used AP credit for college requirements; 3) no student completed credit that duplicated AP work and 46 earned some AP credit that met no requirement; 4) 19.4% graduated with excess credit above the minimum degree requirement; and 5) early graduation was achieved in less than four years by 8.3% while another 165 or 76.4% graduated in four years. The amount of AP credit and graduation date correlated negatively and significantly for native students. There was no significant relationship between the amount of AP and excess credit.

While few students graduated in less than four-years, the four-year graduation rate for students with AP credits was significantly higher than the rate for the student body as a whole. However Cusker noted that evidence that AP participation decreases time to degree has been sporadic and unconvincing throughout more than 40 years of AP history.

Morgan, R. and Klaric, J. (2007). AP Students in College: An Analysis of Five-Year Academic Careers. College Board. Retrieved from: <http://research.collegeboard.org/publications/content/2012/05/ap-students-college-analysis-five-year-academic-careers>

Morgan and Klaric compared the academic careers of students who took AP exams with those who did not take AP exams. Their research was based on data on students entering 27 different institutions in 1994. They study included five research questions, including questions related to performance in intermediate college courses and graduation rates.

The researchers sought to determine if performance in intermediate-level courses into which AP students are placed is comparable to that of non-AP students. They compared the performance in intermediate courses for AP students receiving advanced placement with students who took the introductory college course. In general, AP students performed better in the intermediate course than students who took the introductory course, even when adjusting for SAT scores to control for level of academic ability; however, for students who scored a 3 on the AP exam, the differences were smaller and statistically significant for only three exams.

Morgan and Klaric also examined the graduation rates for AP students compared to non-AP students. They determined that even after accounting for the higher SAT scores of AP participants, their completion rate was higher than non-AP students.

Hargrove, L. Godin, D. & Dodd, B. (2008). College Outcomes Comparisons by AP and Non-AP High School Experiences. College Board. Retrieved from:
<http://research.collegeboard.org/publications/content/2012/05/college-outcomes-comparisons-ap-and-non-ap-high-school-experiences>

Hargrove, et al. examined post-secondary outcomes of students based on their AP experience. Outcomes measures included first- and fourth-year GPA, first- and fourth-year credits earned, and four-year graduation. AP experience was delineated in several ways – course only, exam only, both course and exam, non-AP dual enrollment, and non-AP other course only. The study was based on five cohorts of 1998-2002 Texas public high school graduates enrolled at a Texas public higher education institution.

The researchers examined differences in college outcomes based on AP experience, accounting for a number of factors including SAT score, family income, and AP exam grade. Overall, they found that subject specific analyses showed that students matched on SAT scores and family income who took both and an AP course and exam outperformed students who took only the AP course, and students with dual enrollment only or other courses (both non-AP) on all college outcomes. AP course and exam students graduated at consistently higher rates than any of the other groups, and those students with the highest AP exam grades graduated at the highest rates.