2019

The Impact of the IB Diploma Programme on Student High School and Postsecondary Experiences: US Public Schools Serving Students from Low-Income Households

Jongyeon Ee
joy.ee@lmu.edu

The Impact of the IB Diploma Programme on Student High School and Postsecondary Experiences: U.S. Public Schools Serving Students from Low-Income Households

Ursula S. Aldana, Ph.D.
University of San Francisco and
Anysia P. Mayer, Ph.D.
California State University, Stanislaus
Jongyeon Ee
Loyola Marymount University

October 2019

TABLE OF CONTENTS

Introduction

Low-income students in the United States come disproportionately from the ranks of African American and Latino youth (Gándara & Contreras, 2009; Rothstein, 2004). While they only make up one-third of all children in the U.S., African American and Latino children account for more than three-fourths of youth living in severely poor neighborhoods (O'Hare & Mather, 2003). As a result, the effects of poverty serve to negatively shape the educational experiences of underrepresented minority low income students, causing them to often lack access to excellent schools and equal opportunity. Low-income Latino and African American students are more likely to attend hyper-segregated schools that are overcrowded, contain lower teacher quality, lack rigorous college preparatory classes such as honors and AP classes and have overall fewer resources (Oakes & Rogers, 2006; Orfield & Lee, 2005, 2006). The first to potentially attend college in their families, these low-income students are at a higher risk of dropping out of high school and have poorer achievement rates in high school and in college, which will inevitably negatively impact their adult lives (Gándara & Orfield, 2010). According to the National Center for Educational Statistics, only half (50.9%) of recent low-income high school completers (a category that includes both graduates and people who completed an equivalency degree and who are ages 16 to 24) were enrolled in a 2- or 4-year college (2012). Immigrant students from low-income households are particularly affected by low educational attainment (Aud, Fox, & Kewal-Ramani, 2010; Ngo & Lee, 2007; Gándara & Contreras, 2009) and Latino students, who now comprise 22 percent of the school-age population, are the least likely to graduate from high school or college (Gándara & Aldana, 2014; Gándara & Contreras, 2009; Goldrick-Rab, 2006).

Multiple factors in the lives of low-income youth contribute to disparities in academic performance relative to more privileged students. Studies find that students living in poverty and English Language Learners (ELL) are overrepresented in urban schools and low-track classes, while

affluent students tend to be overrepresented in high-track (college prep) courses (Ngo & Lee, 2007; Noguera, 2003; Oakes, 1992). By limiting access to academically rigorous, developmentally appropriate content courses, schools fail to prepare students for postsecondary education, and often even for high school graduation (Callahan, et al., 2010). Even while college enrollment numbers have generally increased for target groups such as low-income student and racial minorities, 64.7 percent of low-income students enrolled in a 2-year college and 31.9 percent enrolled in a 4-year college require remediation (Complete College America, 2012). Simply increasing the number of students enrolled in college is not the same as increasing the number of students who are prepared for the rigor of college.

Students from low-income households who are often the first in their families to go to college generally experience less than ideal schools. However, several innovative programs have emerged to provide a rigorous college preparatory curriculum for low income students. We argue that one of the most important is the IB Diploma Programme (IBDP).

The IB offers a rigorous college preparatory program that could potentially serve to improve the academic experience of first generation and low-income students in high school and beyond. This study examines the academic outcomes and experiences of low-income students participating in the IBDP as well as their experience in college.

Literature Review

The International Baccalaureate Diploma Programme (IBDP) is a rigorous college preparatory curriculum for 11th and 12th grade that is made up of the DP core and six subject groups (studies in language and literature; language acquisition; individuals and societies; sciences; mathematics and the arts). In this manner, students take content courses in the subject areas while the DP core provides space to broaden their understanding and challenges them to apply their knowledge and skills. The DP core is made up of three elements:

- Theory of knowledge, a course in which students reflect on the nature of knowledge and on how we know what we claim to know.
- The extended essay, which is an independent, self-directed piece of research, finishing with a 4,000-word paper.
- Creativity, activity, service, in which students complete a project related to those three concepts (IB, 2019).

Given its prestige the IBDP has been utilized as a tool to desegregate schools using its rigorous curriculum and foreign language component to attract middle class students to schools serving large populations of low-income students (Mayer 2010). Emerging research also indicates that low-income and minority students experience improved outcomes when participating in IB DP (Culross & Tarver, 2011; Mayer, 2008). A recent study comparing IB and AP students at two high schools in one district in Central California serving primarily students of color who would be the first in their family to attend college found IB and AP had very similar, GPAs, and SAT scores (Luo, 2013). However, students in the AP and IB programs tended to come from families that were wealthier than the majority of the students at their schools. Thirty seniors from each program were also given a survey to measure their classroom experiences. Of note, is that both IB and AP students

felt their classes were much more rigorous than students in regular English classes. Neither group felt the course workload was too much for them to handle. In addition, IB students strongly agreed with statements regarding the creativity and level of critical thinking required for their classes. They also felt very positive about ways the program developed their communications, cultural awareness and increased their sense of belonging at school.

While advanced course offerings like AP and IB have expanded across the nation African American and Latinx students' opportunities to enroll to advanced academic coursework still significantly lag behind their White peers (Klugman 2013; Perna et al., 2015; Welton, Diem, & Holme, 2013). The problem is most likely due to a number of individual and structural barriers that exist within the educational system. Expansion has yet to fully see fruition in small rural schools (Clark, Scafidi, & Swinton, 2012) and students of color remain underrepresented in AP/IB courses at suburban schools, which are schools that offer the greatest number of college preparatory courses (Kettler & Hurst, 2017). AP /IB course offerings have expanded but research suggests that students in underfunded schools do not have the same experiences in those courses as other students in better resources schools (Hallett, & Venegas, 2011). A decline in AP exam pass rates corresponding with the expansion seems to suggest that the quality of teaching may be an issue (College Board, 2017). Teacher recommendations also present barriers for students of color (Rowland, & Shircliffe, 2016; Wildhagen, 2012). In addition, when these courses are offered at schools populated by underserved students these students often see themselves as unable to master the curriculum, likely to get a low grade, and as a result they self-select out of AP classes (Witenko, Mireles-Rios, & Rios, 2017; Young, Ero-Tolliver, Young, & Ford, 2017). However, research suggests prior academic achievement continues to be the most significant predictor of AP course taking (Conger, Long, & Iatarola, 2009).

Given the disparities opportunity and participation across student populations some have begun to question the fairness of giving students who take advanced courses admissions advantages (Geiser, & Santelices, 2004). This argument is further supported by research that suggests that the extra grade point inflates students' GPAs (Esposito & Mayer, 2014), while other research suggests students who take AP courses do not appear to influence college performance (Shaw., Marini, & Mattern, 2013). Further research of IB programmes is needed to focus on students from low-income households and how they perform both in high school and college to determine how the participation in an IB programme impacts their academic trajectory.

Methodology

Research Purpose and Questions

This study examines the secondary and postsecondary experiences of Diploma Programme (DP) students in California public schools serving predominantly students from low-income households with little or no history of college-going. The study was guided by the following research questions.

1. How do Diploma Programme students from these high schools describe their experience in the programme?
    a. What characteristics, structures and aspects of the programme are most salient to the students?
    b. To what extent do students experience culturally relevant coursework in the IB Programme?
2. How does the academic performance of DP students compare to their non-DP peers?
3. How do DP students from these high schools perform on measures of student engagement and motivation?
    a. How do DP student levels of engagement and motivation compare with demographically comparable students from the same school?
4. What are the aspirations of DP students? How do the aspirations of DP students from low-income households compare to those of similar non-DP students? Specifically, with regard to:
    a. College
    b. Career and/or
    c. Service
5. Are IB Diploma Programme students from low-income backgrounds academically successful in college?
    a. How do Diploma Programme graduates perform in college courses?
    b. Are they on track for earning a degree?
    c. Do they persist in college for at least two years?
    d. Do they complete the degree?

6. How does the postsecondary academic performance and persistence of IB students from low-income households compare with similar non-IB students?
7. How well-prepared do IB students feel for the rigors of college coursework? Specifically, with regard to:
    a. College level writing (in English and foreign language if applicable)
    b. Study skills and time management
8. How well-prepared do IB students from low-income households acclimate/integrate to college life? Specifically, with regard to:
    a. Student organizations
    b. Service
    c. Work
9. What are the perceived key components of the Diploma Programme that best prepare students for the transition to college?
10. What challenges do IB students from low-income households face as they transition to college? What additional supports would better facilitate this transition for IB students? Specifically:
    a. The application process, including financial aid applications
    b. Adjustment to college life and utilization college resources
    c. College coursework and major

Research Design

In order to answer such broad questions, we designed a mixed-methods research study utilizing an embedded research design (Creswell, Plano & Clark 2003) to include both quantitative and qualitative data to answer the range of our research questions. To that end, the study incorporates quantitative data analysis of student perception and outcome data and qualitative research methods to capture the voices and narratives of students. The strength of this design is the premise that a single data set is not sufficient to understand the impact of the IBDP on first generation and low-income students. In order to understand the ways in which IBDP can affect the lives of students- different questions need to be answered and each type of question requires different types of data.

To this end, we developed a multi-case study (Yin 2003) that looked at secondary and post-secondary student performance, levels of engagement and experience. We selected three high schools with IB Diploma Programmes in northern, central and southern California each with a significant portion of low-SES students, to address how the DP impacts the student secondary schooling experience. Within these high schools, we collected data on 36 students to help us understand how the DP influenced their high school to college transition. Over the course of the study (2015-2018) we visited the high schools at least three times each collecting observational field notes and staff/teacher interviews.

Separately, we conducted an analysis of a cohort of students who were enrolled as first-time freshman in 2011 at all eight University of California (UC) campuses using the UC Corporate Data System. This data point allowed for the examination of outcome measures such as college GPA and graduation year, as well as college persistence for IBDP students that matriculated into the UC system. The study also includes the perspectives of 10 former IB students over the course of their post-secondary schooling to investigate the extent to which the IB diploma Programme is associated with college retention, academic success and feelings of belonging. Although the sample was smaller than originally intended, the stories of these students represent the range of post-secondary experiences of IB students who attend two-year, four-year non-selective, and four-year selective universities after the completion of an IB Diploma Programme in a California high school.

Data Collection and Analysis

High schools. After initial contact with IB coordinators in 2015, researchers invited three schools (see Table 1) to participate in the research project. District research authorization applications were submitted and subsequently approved. We contacted the IB coordinator at each high school and asked them initially to provide institutional background and data for the IB programme and school, identify IB students and facilitate the distribution of surveys. Over the course of 2015-2018,

researchers worked to collect data from the participating high schools (see Table 1 in Appendix for additional information on these schools).

Valley High School[1] is located in northern California. The oldest of five high schools in the district, Valley High School is a public school that serves over 2,500 students per year where 80 percent of students are from low-income families and over 70 percent of the school identify as Latino. Researchers visited Valley High School in the fall of 2015 for the first round of data collection. Initial visits included formal and informal interviews with the IB Coordinator and an IB Psychology teacher with over 15 years' experience, to better understand the school's IB programme. During the course of the study, the IB coordinator retired.

Lincoln High School is located in an urban center in central California. Lincoln High School is a public school that serves over 2,300 students per year where over 90 percent of students are from low-income families and three quarters of the school identify as Latino and almost 10 percent as African-American. Researchers visited Lincoln High School in January of 2016 for the first round of data collection. Interviews were conducted with the IB coordinator, MYP coordinator, and principal to better understand the school's IB Diploma Programme.

Dominguez High School is located in a suburb of a large city in southern California. Dominguez High School is a public school that serves over 2,100 students per year where over 90 percent of students are from low-income families and over 35 percent are English learners and over 90 percent identify as Latino. Researcher visited the school over the course of 3 years to interview IB key staff, counselors and teachers as well as to observe IB classes and IB alumni days at Dominguez.

Survey data collection. We developed a survey that was based on a composite of previously validated survey scales. The survey instrument measured: classroom engagement, classroom rigor,

[1] All names of schools and individuals are pseudonyms.

college aspirations, school belonging, school engagement, school learning strategies, school college going culture, and school engagement. Surveys were designed and data were compiled by Panorama Education. Appendix B shows an example of the paper version of the survey.

The survey was distributed electronically at Lincoln High School in English classes in late January 2016. The survey was distributed in paper-and-pen format in English classes at Valley and Dominguez, in January 2016. Students in English classes at Valley and Dominguez do not have access to computers during instructional time. As a result, the coordinators at these two schools distributed paper copies of the surveys to 11th grade English teachers, who in turn administered the surveys to the students during English class. The completed paper surveys were returned to Panorama, who subsequently input the data for analysis. We collected a total of 1,077 surveys. Lincoln High had 313 respondents, Valley High had 480 respondents and Dominguez High had 284 respondents.

We asked the IB coordinators to distribute the second survey to all seniors in English classes in May 2017 in all three high schools. Surveys were given electronically at Lincoln High School. Paper versions of the survey were given to students at Valley and Dominguez because teachers still do not have regular access to computers at these schools. We saw a significant drop in survey participation for the second round of survey distribution. In total, we collected 310 surveys. Lincoln High had 187 respondents, Valley High had 33 respondents and Dominguez High had 90 respondents. Our goal was to allow for the maximum amount of time for program participation prior to distributing the survey including participation in IB exams. However, distributing the survey in May proved difficult for the IB coordinators, due to the many demands on the time of seniors just prior to graduation. Unexpectedly, the IB coordinator at Valley high (with plans for retirement) did not give the survey to her IB students.

Survey data analysis: Using survey data collected from three high schools in California, we conducted a series of multivariate ordinary least squares regression models on multiple outcome variables, encompassing learning- and classroom-related topics (learning, classroom rigor, classroom engagement, school engagement, teacher student relationship) and college-related topics (college-going culture, college advising, and college aspiration). To compare the relative magnitude of individual variables, the present study reports standardized coefficients. Individual models include a set of covariates, such as a student's IB participation/ status, race, gender, home language, self-reported GPA, maternal education level, and high school.

With regard to the IB participation/ status variable, the present study created four groups based on the degree to which students took DP courses and exams when the survey for this study was administered: non-IB students, full Diploma Programme (DP) students, partial DP students, and other students[2]. Non-IB students were those who were not enrolled in an IB program and did not respond to the question; these students were used as a reference group to examine the impact of IB participation on students' educational experiences. Full DP students were those who planned to compete the requirements for the IB Diploma Programme[3]. Partial DP students included those who planned to complete the IB Career-Related Programme and who were taking DP courses and planned to take DP exams. Finally, other students were those who were registered for DP courses but did not plan to take the corresponding DP exams.

As for the race variable, the reference group included students who identified themselves Latino or Hispanic. The other groups included White, African American, Asian, American Indian, and multiracial students. The home language variable was binary: 0 for non-English spoken at home

[2] The research summary published by the IB uses a slightly different terminology: "DP candidates" to indicate "full DP students" and "DP course students" to indicate "partial DP students".
[3] More details about the requirements for the full Diploma Programme can be found on the IB website: https://www.ibo.org/programmes/diploma-programme/curriculum/

and 1 for English spoken at home. The gender variable was also binary: 0 for females and 1 for males. The self-reported GPA variable was based on a respondent's answer to the question of "what kinds of grades do you usually get?" and ranged from 1 (mostly Fs) to 9 (mostly As). The maternal education variable was the highest level of education completed by a respondent's mother and ranged from 1 (elementary school) to 8 (graduate degree). This variable was considered as a proxy measure for income on exploring the outcome variables of interest in this study. Additionally, due to distinct school-level characteristics in the data, a dummy variable for schools were employed to investigate differences among the schools. Valley High was set as a reference group because of the majority of students in the sample came from this school.

Interviews with IBDP students. To understand low-income student pathways through college this study utilized a longitudinal design that allowed for the following of IBDP students transitioning from secondary school to college. A first group of students consisted of 36 low-SES and first generation[4] students chosen from a subset (students in the IBDP) of all juniors attending one of the three high schools in 2015-2016. We shared our search criteria with the IB coordinators at each school and in turn, they identified and asked students if they wanted to participate in the study. Not surprising given the context of these high schools, the overwhelming majority of students we interviewed identified as Latino, low-income and parents did not attend or complete college. Initial individual interviews took place during the fall of students' junior year in high school on their high school campus. These 30-minute interviews queried students' IB high school experiences, college and career aspirations, potential college choices and the influence of peers and family. Please see *Appendix C* for the interview protocol for high school interviews.

[4] We use the term *first generation* to identify students whose parents did not graduate from a US college.

Researchers visited Valley High School (HS) in Fall 2015, and Lincoln and Dominguez high schools in January of 2016 for the first round of data collection. We individually interviewed 10 juniors from Valley HS in the IB programme; 17 juniors from the Lincoln HS IB programme in January 2016 and 9 juniors from the IB programme at Dominguez HS during winter 2016. We collected a second round of interview data at each high school in spring 2017 that included most if not all of the students from our first data collection wave, who were thus in their senior year of high school. These interviews focused on the college plans and particular reflections on their IBDP experience. The following year, a third wave of data collection from the original 36 students was initiated to hear students experiences in college. We experienced some difficulty finding students after high school, but connected with 13 of the initial 36 participants. A little more than one-third of the original group, these students (5 from Lincoln HS; 4 from Valley HS and 4 from Dominguez) updated us on their transition to college and their reflections on the IBDP.

To understand low-income student experiences in college this study also looked at the perspectives of first-generation college students who participated in an IBDP. This second group of 10 college students was based on our contacts with high school IB counselors and college staff at various state and community colleges. We employed a snowball sampling method to identify a group of individuals that participated in an IBDP and graduated from a California high school in 2014 or 2015. We invited these former IB students over email to interview with us about their transition from high school to college. We also contacted potential participants from an IB alumni database that participated in an IB programme and graduated from a high school in California in 2015. In total, we interviewed these 10 college students two times over the course of their collegiate experience (2016-2018). Students received a $25 gift card for their participation in an extended interview where they shared their individual stories. Interview questions explored students' secondary and postsecondary

experiences including the IBDP, as well as insight into their familial and social contexts (see Appendix C for sample Interview protocol).

A review of the interview data was conducted after survey analysis was completed. We utilized the interview data to help explain the survey data but also to explore how first-generation students experience the IBDP. Towards this end, we inductively developed major themes associated with the measures we surveyed (e.g. classroom engagement, classroom rigor, college aspirations, school belonging, school engagement, school learning strategies, school college going culture, and school engagement). Each interview was coded for this first round of themes, but also for emergent themes related to IB curriculum and student experience. Emergent themes such as workload and peer support came up often with both high school students and college students. Researchers used existing literature on first generation students to describe these themes and discussed with the other researcher to ensure reliability. Analysis of the interview data provided rich examples to research questions as well as critical discussion points for those interested in serving first generation students in an IB Diploma Programme.

University of California Longitudinal Data Set. In July of 2015, we began working with researchers from the University of California, Civil Rights Project to obtain and analyze the student data set from the Institutional Research & Academic Planning (*IRAP*) department of the University of California Office of the President (UCOP). The team submitted the research proposal to IRAP in August 2015. The proposal was reviewed by IRAP from September until November 2015. The data was given to UCLA researchers in December 2015. The data set includes data for students enrolled at the Berkeley, Davis, Irvine, Los Angeles, Merced, Riverside, San Diego, San Francisco, Santa Barbara and Santa Cruz campuses. We requested and subsequently analyzed individual student level data for students who entered the University of California System between 2006 and 2008. The data set contained combined information on the students across 9 years.

The data set we received from IRAP included 13 of the 15 variables we originally requested from IRAP (for more information about the IRAP variables, please see Appendix D). Due to potentially small cell sizes IRAP does not provide data on specific campus enrollment. In addition, due to concerns about small cell sizes IRAP does not provide specific racial or ethnic data for individual students. Instead they aggregate several racial ethnic groups into a single variable. Finally, IRAP does not collect parent education data. Initial analyses were conducted January through March 2016.

We used propensity score matching (PSM) and nearest neighbor matching (NNM) throughout our analyses to obtain unbiased estimates of the impact of IBDP on student postsecondary outcomes and to conduct plausible estimation of treatment effects.[5] Specifically, we conditioned on predictors, including (1) high school grade point average (HSGPA), (2) number of IB semester courses taken in high school, (3) SAT scores, (4) student major, (5) college persistence, (6) college GPA (UCGPA), (7) underrepresented minority status, (8) whether or not they are a first generation college student, and (9) parent's income level. Outcome measures used in this study were examined in three different ways. First, we investigated students' overall college GPA (UCGPA) after adjusting for predictor variables proposed above. Second, we explored time to graduation: 4-year graduation, 5-year graduation, and 6-year graduation status. Third, first- and second-year college persistence was also examined as outcome variables. For this analysis, "non-persisters" were defined as those who left college with a GPA below 2.0. A detailed report of the analyses conducted, and more detailed results are provided in Appendix D.

[5] We employed two different matching strategies to evaluate the effects of the IB programme in an appropriate way. In order to accomplish matching, nearest-neighbor matching (NNM) is based on the distance between pairs of observations regarding a set of covariates and then matches comparable observations that are closest. This method needs bias correction. Propensity-score matching (PSM) is an alternative to NNM. PSM matches on the estimated predicted probabilities of treatment, known as the propensity scores. PSM does not require bias correction unlike NNM. Further description of the choices for NNM and PSM analyses is included in Appendix D.

Findings

RQ1: How do IB DP students from these high schools describe their experience in the programme?

RQ 1a: What characteristics, structures and aspects of the IB DP are most salient to the students?

High school students pointed to both academic and social aspects of the IBDP as having a positive influence on their high school experience. The IB DP is a comprehensive two-year curriculum that is both vertically and horizontally aligned to promote students' critical thinking skills and deep content knowledge development. The overarching goals of the curriculum are for students to gain both depth and breadth in each area of knowledge, for students to think critically about how all six areas of knowledge[6] fit together, and for students to become engaged global citizens (IBO, 2011). Additionally, the IB DP includes an extended essay requirement that is a self-directed 4000-word research paper, similar to the capstone or senior projects offered in some US schools; a community service requirement; and a theory of knowledge course, similar to that of a college level philosophy course that guides students through epistemological traditions across academic disciplines. Interestingly, the three high schools in the study experienced years of school failure in terms of academic achievement before the introduction of the IB programme. Staff at IB schools that experienced this change in academic culture pointed to the development of a college going culture (Oakes, Rogers, Lipton, & Morrell, 2000) since the introduction of the IB programme.

[6] IB Diploma Programme students must choose one subject from each of five groups (1 to 5), ensuring breadth of knowledge and understanding in their best language, additional language(s), the social sciences, the experimental sciences and mathematics. Student may choose either an arts subject from group 6, or a second subject from groups 1 to 5. (http://www.ibo.org/diploma/curriculum/)

Throughout the course of the study, teachers and counselors related to us the ways in which the IB programme helped students better prepare themselves for college and how their students earned distinctions. Teachers felt that IB classes were better able to prepare these students for college because IB coursework challenged their students to think critically. Teachers and IB coordinators pointed to the high expectations imposed on students as part of IB classes and course assignments that would ultimately best prepare students for college. Our interviews with students revealed what the IB programme offered students a place to engage in critical analysis that not only challenged them but was absent in other courses. We heard students recount how these course and assignments asked them to consider multiple perspectives and develop an analysis. We found that students perceived that the IBDP provided a level of rigor which was integral to succeeding in college.

In particular, most if not all students suggested they enrolled in the IB programme because it could provide a college preparatory curriculum. Interviews with students in this study reflected stories of families wanting a rigorous college preparatory experience for the student. In some cases, parents were already informed and sought the IB programme whereas in other cases students took it upon themselves to enroll in the programme. Students shared the perception that the IB programme would provide higher level courses that were designed to prepare students for college. We found that IBDP students in these high schools experienced an increased workload and rigor often reflected in both the number and quality of assignment in IBDP. Additionally, in all of the schools we found English and history teachers using class time and course assignments to support students' college applications.

> It was actually typical during in class with my history teacher, because the way he works right now he says that we're not students anymore, we're colleagues. That we're at this level where we're able to share resources and everything. And so, he was very open in how he helped us.

If we wanted something to help with, he'd say "Just come to me and I'll give you these resources. (Oscar male student, Lincoln high school)

On our visits to these schools, we observed classes where teachers almost always mentioned college or made reference to the college application. We should note that each of the high schools in this study served a very high low-income, working class community where a college going culture is not the norm. As we inquired about each school, we found each school had an additional program to help develop and sustain a college going culture on campus (See Table 3 for breakdown of student participation in other programs such as AVID, Upward Bound and UC Talent Search). Students referred to these kinds of programs as important additional support for students especially when they struggled to maintain good grades or apply to college.

AVID's so helpful with college and I feel like, without that program, I would be lost. The four years, they'd always search up colleges, research, do so many things, poster, pamphlets. And it finally came down to the decision where we looked at every single little detail to make our last decision money wise, the loans to help us, and little resources. And that's all what came together. I can do CBU later. (Susan female student, Dominguez High School)

Our survey data analyses found that students in the IB Diploma Programme generally felt supported to engage in a rigorous classroom experience as part of their goal of attending college. These schools continued to work on developing a seamless curriculum that supported IBDP students through their course work as well as college and scholarship applications.

Table 3
Breakdown of IB student participation in other programs (AVID, Upward Bound and UC Merced Talent Search: Did you Participate in any of the Following in 9th or 10th grade?)

	All Students	Non-IB Students	Full IBDP Students	Partial DP Students	Other Students
IB Middle Year Programme					
No (N)	323	210	19	50	44
No (Proportion)	0.582	0.82	0.271	0.331	0.564
Yes (N)	147	24	24	76	23

Yes (Proportion)	0.265	0.094	0.343	0.503	0.295
Not available (N)	85	22	27	25	11
Not Available (Proportion)	0.153	0.086	0.386	0.166	0.141
Total (N)	555	256	70	151	78
Honors/Advanced courses or pre-IB track in 9th and 10th grades					
No (N)	320	207	10	64	39
No (Proportion)	0.576	0.805	0.143	0.424	0.5
Yes (N)	211	40	55	82	34
Yes (Proportion)	0.38	0.156	0.786	0.543	0.436
Not available (N)	25	10	5	5	5
Not Available (Proportion)	0.045	0.039	0.071	0.033	0.064
Total (N)	556	257	70	151	78
AVID					
No (N)	380	194	35	100	51
No (Proportion)	0.684	0.755	0.5	0.662	0.654
Yes (N)	137	57	27	35	18
Yes (Proportion)	0.246	0.222	0.386	0.232	0.231
Not available (N)	39	6	8	16	9
Not Available (Proportion)	0.07	0.023	0.114	0.106	0.115
Total (N)	556	257	70	151	78
Upward Bound					
No (N)	441	204	55	130	52
No (Proportion)	0.798	0.797	0.797	0.861	0.675
Yes (N)	45	12	8	14	11
Yes (Proportion)	0.081	0.047	0.116	0.093	0.143
Not available (N)	67	40	6	7	14
Not Available (Proportion)	0.121	0.156	0.087	0.046	0.182
Total (N)	553	256	69	151	77
UC Merced Talent Search					
No (N)	381	186	32	115	48
No (Proportion)	0.689	0.727	0.471	0.757	0.623
Yes (N)	30	7	7	10	6
Yes (Proportion)	0.054	0.027	0.103	0.066	0.078
Not available (N)	142	63	29	27	23
Not Available (Proportion)	0.257	0.246	0.427	0.178	0.299
Total (N)	553	256	68	152	77

Note: Groups are defined as follows: (1) Non-IB students: I'm not enrolled in any IB courses. (2) Full IBDP students: I am planning to complete the full IB Diploma Programme.; (3) Partial DP students: I am taking at least one IB class and plan to take at least one IB exams; (4) Other: I am taking at least one IB class but do not plan to take any IB exams.

Our analysis of the data also reveals how students in the IBDP sought and received additional support to help them develop stronger study skills. IB faculty at each school acknowledged the difficulty many of their first-generation students had acclimating to the rigor or the demands of the high school college preparatory coursework. In response, we found that the IBDP staff at these

schools developed support systems specifically targeting IBDP students. For example, at Dominguez we observed and heard students discuss the Phoenix Program. This was a recognition program designed by the IB coordinator to encourage students who faced significant challenges in high school to keep moving forward. It is not uncommon for students at these schools to face significant challenges such as divorce, homelessness, illness, loss of family income, neighborhood violence, etc. These circumstances often result in a dramatic decline in the student's academic performance. However, at Dominguez the focus is not on the "fall" but on "getting-up". The Phoenix Students are publicly recognized by the diploma programme and asked to share their stories with freshman students. Our data suggest that while this award was structurally a small part of the DP at the school (the award itself was a small medal at a recognition ceremony), culturally it appeared to have a large influence over the students.

> I would like talk to our DP coordinator a lot about it because I was worried. And he would tell me that I was a perfect example of a student that falls and then gets up, because I had a 2.8 on my transcript and a D. So, I eventually got up with all my IB classes and made way good grades and I just became drained but I liked it because there was always someone to talk to if I was having a really bad day where I just needed a breakdown. I'm really close to the counselors- like all of them with Coordinator. And they are always willing to help and be able to just listen as well because they say it's not an excuse, it's a circumstance. (Elena, female student, Dominguez High School)

Students and teachers shared the perspective that the rigors and challenge of IB helped them recognize that circumstance should not determine the rest of the student's life. Instead, these schools explicitly taught students how to balance their intense workload as well as develop critical skills that would help them work through and persist towards their academic goals. Research suggests that this sort of attitude may go a long way to supporting students (Joseph et al., 2015). In doing so, these

courses allowed for a diverse group of students to enter a college preparatory course of study that might have otherwise never been given the opportunity to experience this level of rigor.

In addition, students underscored the critical importance of the IBDP faculty and staff. The students at these high schools recognized the effort put forth by IB teachers and particularly the IB Coordinator. In all of the three high schools, we learned the IB coordinators usually taught one course but could be teaching up to a half load of courses. We found students generally felt supported in their academic pursuits. All students we spoke to had received positive social-emotional support from their IB teachers and IB Coordinators.

> And I get along with all my IB teachers. I love all of them. It's because we're closer. I don't really even know how to describe it. In the other classes, you get in, "I'm going to give you this. If you take it, fine. If you're not going to take it, that's fine too." And then get out. It's just a year, and I feel like if you want to get close to teachers it's an effort that you have to make versus in IB I think it's on both ways. The student and the teacher are meeting halfway. So I really appreciate that about IB. I feel like our teachers here really do care. Versus in regular classes where they have bigger people that ... Not necessarily everyone that's in the class wants to be there, versus in IB everyone wants to be there. Otherwise, you wouldn't be there. I don't know, it's just the environment is better. And the way that the teachers help and make an extra effort really helps me, because then I know that at least I'm not doing ... not that I'm not doing it for nothing, but that I'm doing it and someone sees my effort. So I really like it. (Gabriel male student, Lincoln High School)

We find the importance of teacher and counselor support for these IBDP students could not be understated. Each of the students we spoke to could identify multiple teachers and staff that provide academic and/social-emotional support at their high school.

RQ 1b: To what extent do students experience culturally relevant coursework in the IB programme?

The IB programme's language policy across its programmes promotes multilingualism among all students. The IB educational philosophy incorporates additive bilingualism (Cummins, 1994), i.e., learning both the mother tongue and another language simultaneously. Both languages are viewed as a right and a resource:

> Students learning in a language other than their mother tongue should no longer be framed as a "problem"; a multilingual view recognizes diversity in language profiles as the norm. Whole-school practices that honor this, however, need to be put in place if all students, including those who are learning in a language other than their mother tongue, are to have equal access to the IB programmes. Isolating English as a Second Language (ESL) students from the mainstream, in an attempt to teach them the language they need separately from the subject areas, is not a practice that honors multilingualism. (IBO, 2011, p. 13)

As a truly international program, the IB does not privilege any particular language; it simply requires that students demonstrate a competency in at least two. In our study, we found that the overwhelming majority of students in the IBDP were heritage language (Spanish) speakers. In our conversations with them, they identified they were able to complete the IB language course requirement by taking these classes in their native language. At many of these schools, Spanish teachers wanted not only to capture students' Spanish language skills, but also to develop bilingual, biliterate graduates. These IB DP students participated in writing and oral assignments that mirrored college level foreign language classes. The creation of IB native Spanish speaker courses allowed these schools to offer a rigorous course that challenged their heritage Spanish language students. From a curricular and policy perspective the IB programmes offer a particularly attractive alternative for meeting the needs of heritage Spanish speakers, supporting bilingual language development.

> The "International Baccalaureate also aims to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect" (IBO, 2011p. 12).

In this manner, the IB philosophy aims to develop students' ability to respect sociocultural identity, understand differences, tolerate ambiguity, serve the community, and take an individual role in creating a more peaceful world. Adoption of an IB programme does more than facilitate multilingualism; it encourages "students across the world to become active, compassionate and lifelong learners who understand that other people, with their differences, can also be right" (IBO, 2011, p. 15). For the Latino students in this study in particular, implementing an IB programme has the potential to improve their educational experience not only via rigorous instruction in two languages, but also through a culture of learning whereby reducing prejudice and valuing diversity is a major tenet of the programme. We inquired about this through one question on the survey and one question in the interview protocol that directly asked about teachers making connections to students' culture and background.

Analyses of this survey data suggest students had a wide range of experiences in their English classes. The survey question asked if*: The teacher for this class often connects what I am learning to my culture or background.* Descriptive analyses of this question reveal that across the three schools students' responses became more polarized from year 1 (Y1) to year 2 (Y2). While more students responded strongly agree in year 2 compared to year 1 at Valley (Y1: 7%; Y2: 14%) and Dominguez (Y1: 9%; Y2: 17%). More students also responded that they strongly disagreed in year 2 at Valley (Y1: 9%; Y2: 11%) and Dominguez (Y1: 9%; Y2: 16%). There was little change in students' responses over time at Lincoln high.

The qualitative data explains some of this variation. First, in interviews students explained that connections made to their home language and culture were made most often in their language B

classes. Thus, the fact that the survey question directed students to think of their English class may have triggered different responses regarding connections to students' culture and background. The quote below from a student who immediately thought about her Spanish class is a typical response to our interview question:

> We've just recently did something for an assignment for Dia De Los Muertos. So, that's something cultural and I liked how he made up that assignment because it's good to bring it up because we're all Mexican in the class. We all speak Spanish. And it was a drawing project and I love Art. It was really, really creative. I liked it. (Monique female student, Valley High School)

Thus, our interview data reveals that the majority of students felt some cultural background is relevant to their learning particularly in the Spanish classrooms.

Secondly, we found evidence to suggest that the Latinx, who were the majority of the student population in all of the three schools, did not tend to think deeply about their cultural backgrounds or expect that their cultural background was something that should be included in their schooling experience. For example, one student who identified as Mexican American had the following exchange with the interviewer:

> Interviewer: You're Mexican, your cultural background, I wonder if any of that stuff ... Do you ever get to share that stuff at school?
>
> Student: Well, most of the students here are usually Hispanic and there's a really big population of Hispanic kids here, so I feel like it's comfortable to talk about where you're from, especially if you're from Mexico or from Central America. I, personally, wouldn't be able to answer that because I'm from the majority of the school. I feel like that would be more helpful for you to ask someone who is in the minority, like for example an American Indian or an Asian student. (Maria female student, Dominguez High School)

Another student who also identified as Mexican American said something that seems to exemplify a color-blind mentality. She said:

> I don't feel like our culture, personally, really gets involved with our class, and I feel like that's a good thing because not everyone can relate to the same culture and that's obvious. I don't feel like that's a big factor in our education. (female student, Dominguez High School)

Third, we found that the tensions that emerged in the U.S. due to the election of Donald Trump and the anti-immigration rhetoric that emerged during the campaign was being felt by the students in our schools. The conversation below is one we unfortunately heard at each of our schools.

> Interviewer: I wonder if having that migration experience and having a unique cultural background, do you feel like that ever gets talked about in classes? Do you get to share or talk about migration as a world-wide issue? I am curious if that ever finds its way into the curriculum?
>
> Student: Not really because I feel like a lot of students are not comfortable talking about it. So they *(teachers)* don't want to put students in an awkward position to talk about it… I feel like some people aren't very comfortable with talking about things like that… Because of migration and immigrants and illegal immigrants and how they see it as such a horrible thing. But it's like, how they've been recently talking about in politics and stuff about Donald Trump and how much he hates illegal immigrants and how we bring over rapists and all that bad stuff. They do not understand that there's good people, students that just want to learn and go to college and do great things.
>
> Interviewer: Wow, so you think that because of that tension you don't get to talk about some of the cool things that are important?
>
> Student: We do talk about immigration in general, but teachers don't really ask us, “What is your personal opinion?” We might talk about it and we write about it, but it's not like you can

talk about your personal experience. Teachers don't want to ask, "are you an immigrant?" (Juan, male student, Lincoln High School)

We find that that IB programme offers heritage language learners in particular an academic experience that reframe the student's primary language as an asset through the provision of an internationally prestigious curriculum based on rigorous academic standards. And while the IB philosophy in general aims to develop students' ability to respect sociocultural identity, understand differences, tolerate ambiguity, serve the community, and take an individual role in creating a more peaceful world. Local context and political climate as well as the experience of teaching staff can depress the impact of this philosophy at the individual course level.

RQ 2. How does the academic performance of DP students compare to that of their non-DP peers?

This research question was addressed using the University of California Office of the President longitudinal data set that included data of the freshman cohorts who entered the University of California (UC) between 2006 and 2008. A similar study that looked at IB students enrolled in the UC system found that in 2001, 649 students, and in 2002, 496 were enrolled in the UC system (Shah, Dean & Chen, 2010). Our data set include 100,046 students. In this data set 4,609 reported taking at least one IB semester course in high school and 3,241 reported taking more than 8 semester courses. Our study used a relatively high threshold for determining IB participation. The UC data report the total number of IB semester courses taken, planned, or in-progress in 10^{th}, 11^{th} and 12^{th} grades. This broad reporting criteria encompass not only students who finished the programme but students who were in progress. We estimated that the use of this broad definition of IB students had the potential to severely underestimate the true effect of the programme; hence, we used a conservative threshold to define IB students in this study. Considering multiple factors, including descriptive statistics based on

different cut-off numbers and feedback from IB officials, we defined IB students as those who reported eight or more IB semester courses taken, planned, or in-progress. Students who reported less than eight IB courses taken, planned, or in-progress were classified as non-IB students. Approximately 97% of the students included in this category had taken no IB courses or exams. For the group of students who took 8 or more IB classes the average SAT score was 1801(SD 234.2), for the non-IB students it was 1699 (SD 262.6) $t(33447)= 11.59$, $p<0.001$. The IB group, in general, outperformed the non-IB group, and the difference in the test scores was dramatically different. As for high school GPAs, we also found a similar result. There was a statistically significant difference in the high school GPAs between IB students (M=3.85, SD=.34) and non-IB students (M=3.78, SD=.38); $t(99056)= 10.40$, $p<0.001$. IB students, on average, performed better than their non-IB counterparts in terms of high school GPA results. More detailed analyses of students' performance in college are presented in later sections of this report and are also included in Appendix D.

RQ 3. How do DP students from these high schools perform on measures of student engagement and motivation?

RQ 3A: How do DP student levels of engagement and motivation compare with those of non-IB students?

Before we discuss the experiences of the IB students we will briefly discuss the high school context in general. There were three scales on the survey, school engagement, school culture and school belonging that could be compared to the Panorama national data set. Panorama national benchmarks include survey results from more than 430 districts, 5,900 schools, and 3.5 million respondents (across all stakeholder groups) across diverse geographic areas, school types, and achievement levels. Compared to all schools in this national dataset the schools participating in this study scored near the 10th percentile on all three scales. This means that 90% of the students in the

national sample have more positive school experiences than students in the three schools. Our UCOP student data from 2006-2008 suggest that less than 15% of students that attend the University of California attend schools like the ones in our study and only about 13% of the IB students who were at UCs attended schools like the ones in our study. These data provide us with an important lens through which we should interpret the results that follow. Previous research also suggests that the IB students at schools like the ones in our study are likely experiencing schooling contexts much more challenging than the majority of their peers in middle-income and high-income schools in the US (Reddick et al. 2011). A recent national study indicates:

> Compared with schools in middle-income, and high -income communities, schools located in low-income communities are more likely to be assigned the least experienced teachers and administrators, to have the worst facilities, and to have the highest rate of teacher turnover among teachers and principals. Their students are more likely to experience racism, violence, homelessness and a severe lack of medical services. On average, these students depend more on their school and teachers for their learning than students in higher-wealth communities. (Johnson, 2019, p. 12).

To answer research question three, we analyzed the survey data collected in year 1 and year 2. We conducted a series of multivariate ordinary least squares regression models on multiple outcome variables, encompassing learning- and classroom-related topics and college-related topics. Specifically, the learning/classroom-related domains that we included were: learning, classroom rigor, classroom engagement, school engagement, and teacher-student relationship. College-related domains included college-going culture, college advising, and college aspiration. To allow for comparison of the relative magnitude of effect across these separate regression models, the present study reports standardized coefficients. Each regression model included a set of covariates (i.e.,

student's IB participation/ status, race, gender, home language, self-reported high school GPA, maternal education level, and high school affiliation).

With regard to the IB status variable, we created four groups based on the degree to which students took IB programmes when the survey for this study was administered: non-IB students, full IB Diploma Programme students, partial DP students, and other students. Non-IB students were those who were not enrolled in an IB programme and did not respond to the question; these students were used as a reference group to examine the impact of IB programmes on students' educational experiences. Full DP students were those who planned to compete full IB Diploma. Partial DP students included those who planned to complete the IB Career-Related Programme and who were taking IB courses and planned to take IB exams. Finally, other students were those who were taking IB courses but did not plan to take IB exams[7].

As for the race variable, a reference group was those who identified themselves Latino or Hispanic. The other groups included white, African American, Asian, American Indian, and multiracial students. The home language variable was binary: 0 for non-English spoken at home and 1 for English spoken at home. The gender variable was also binary: 0 for females and 1 for males. The self-reported GPA variable was based on a respondent's answer to the question of "what kinds of grades do you usually get?" and ranged from 1 (mostly Fs) to 9 (mostly As). The maternal education variable was the highest level of education completed by a respondent's mother and ranged from 1 (elementary school) to 8 (graduate degree). This variable was considered as a proxy for income on exploring the outcome variables of interest in this study. Additionally, due to distinct school-level characteristics in the data, a dummy variable for schools were employed to investigate differences

[7] This set of variables was created because of the English course offerings at Valley High School. At Valley to meet Common Core standards the school offers DP literature courses to all 11th and 12th graders in the school. Although t much fewer in number, Lincoln. and Dominguez teachers also allow students to take one DP course as an elective in the 11th and 12th grade.

among the schools. Modesto High was set as a reference group because of its substantial proportion among respondents in the survey data.

Results of regression analyses, for both Year 1 and Year 2 survey data, showed that DP students were more satisfied with their educational experiences than non-IB students, when controlling for student demographic characteristic, academic achievement and high school affiliation. Specifically, Full IB Diploma students had in both year 1 and year 2 significantly higher scores than non-IB students on all except one of the learning/classroom-related measures (i.e., learning, classroom rigor, classroom engagement, school engagement). The one exception was the Teacher-Student relationship domain: in Year 1 DP students did not differ significantly from non-IB students. On this scale the majority of students in the sample strongly agreed or agreed with statements such as "My teacher is willing to give extra help if I need it.". Overall, this is a positive finding and may suggest that the commitment DP students felt from their teachers is not something the teachers provide only to their DP classes. However, in Year 2 Full IB Diploma students reported higher scores than non-IB students did on the Teacher-Student relationship measure. Partial DP students also scored higher than non-IB students on the measure of classroom rigor, classroom engagement, school engagement in year 1 but the difference was not statistically significant in year 2. We conclude that overall, DP students experience more rigorous classes, are more motivated, and are more engaged than their non-IB peers. Tables of results for the regression analyses and a summary of significant differences are provided in Appendix E.

GPA and Student Engagement. For both years, one variable that consistently emerged as significant for our analyses of survey data was self-reported GPA. We discuss next what previous research found about the close relationship between GPA, motivation, and engagement. In addition to IB programme participation, self-reported GPA was also a significant predictor in almost every area of the survey. National studies suggest that GPA may be a measure of student engagement and

social emotional factors rather than a measure of academic knowledge (Bowers, 2016; Kelly, 2008). Our findings also strongly suggest that GPA is a measure of engagement and motivation. Research also suggests that GPA is predictive of college performance (Bowers, 2016), which our findings confirm. In the analysis of the UCOP data we found there was a statistically significant difference in the high school GPAs for IB students (M=3.85, SD=.34) and non-IB students (M=3.78, SD=.38); $t(99056)= 10.40$, $p<0.001$. IB students, on average, performed better than their non-IB counterparts in terms of high school GPA results. We also investigated students' GPAs at the time of graduation. We found a significant difference in graduation GPAs for IB students (M=3.23, SD=.43) and non-IB students (M=3.18, SD=.43); $t(84720) = 5.79$, $p<0.001$. GPAs were another indication that IB students performed well in college in comparison to their non-IB peers.

RQ 4: What are the aspirations of DP students? How do the aspirations of DP students from low-income households compare to those of similar non-DP students?

Empirical evidence suggest that students' college aspirations are linked to school engagement and GPA (Hill & Wang 2015.) In the literature engagement includes three domains: (1) behavioral: completing course assignments, involvement in extracurricular activities, and course engagement; (2) emotional: having a sense of belonging; and (3) cognitive: sustained commitment to learning activities (Wang, Willett, & Eccles, 2011). These dimensions of engagement were assessed in the surveys that we administered to high school students in 2016 and 2017. This research suggests that engagement, GPA, and aspirations have a positive, reciprocal relationship. Thus, based on prior research we hypothesized that IB students, who are engaged in school, and have good GPAs have higher aspirations than their non-IB peers by 12th grade (Gándara, 2002). However, our findings show little difference in the post-high school aspirations of twelfth grade IB and non-IB students (see Table 4). Specifically, in each group, IB and non-IB, about 80% of students plan to attend and complete

some form of post-secondary education. The area where the aspirations of IB and non-IB students differ are in their plans for 2-year or Community College and 4-year education. While 38% of non-IB students plan to attend a 2-year college, only 27% of IB students plan to attend a 2-year college.

Table 4
2016-2017 High School Student Survey Data – Seniors (Year 2)

	Non-DP Students		**Full IBDP and Partial DP Students**	
Total	**240**		**232**	
Q. What is your plan once you finish high school?				
Continue my education	183	80%	183	80%
Work full time	22	10%	20	10%
Join the military	8	4%	9	4%
Other plans	16	7%	12	6%
Q. I would like to attend a …				
4-year college	112	50%	124	58%
2-year community college	86	38%	58	27%
Vocational school	5	2%	9	4%
Don't know	21	9%	23	11%
Q. What is the highest level of education you plan to complete?				
Undecided	24	11%	27	13%
Graduate school	33	15%	31	14%
4-year college	117	53%	107	50%
2-year college	32	14%	21	10%
Career/technical	2	1%	12	6%
High school	8	4%	13	6%
Other	5	2%	5	2%

Note: Columns do not add to 100% because respondents were also provided with the option of answering "Don't know" although these comprised small percentages.

It is worth noting that there are both Community Colleges and four-year universities in close proximity to the three high schools in the study. For example, Lincoln City College[8] (2-year) is less than a mile from the high school, while a California State University (4-year university) is less than 6 miles away. Valley High School is similarly situated, only 2 miles from Valley Junior College (2-year) and 13 miles from a California State University (4-year). In a major city in southern California,

[8] All college/university names are pseudonyms except for UC and CSU campuses. The UC and CSU campuses are referred to as such.

Dominguez High is 6 miles from Suburban Community College (2-year) and 12 miles from one of the University of California campuses (4-year) and 25 miles from a California State University (4-year). It is possible that the close proximity may lead to higher student aspirations due to students' perceptions the close proximity will mean the logistics of the transition to college will not be difficult (Perna et al., 2008; Robbins, 2012).

We believe there could be two additional reasons for the similar aspirations. One reason for the similarity is explained by Goyette (2008) who suggests that the "college for all" rhetoric has successfully infiltrated high school culture. This research cites national data that in 1980, 43.4% of high school students expected to earn a BA. In 1990 it was 62.0%, and in 2002, it was 84.5% (Goyette, 2008). These percentages roughly match our sample, 80% of whom plan to continue their education. We also expect that the IB programmes are having an overall positive impact on school culture at these schools. For example, we found one high school's mission statement says:

> High School is focused on providing all students with the opportunity to achieve. We accommodate individual learning styles while maintaining high, obtainable expectations for students. Dominguez High School is extremely proud of our rigorous academic programmes (IB, AP and AVID), strong vocational programs (Green Construction Academy, Plant and Animal Academy, Child Development Pathway, and Fine Arts Pathway), great athletic programs, and extensive extracurricular activities that actively engage all students and provide a well-rounded educational experience (SARB Report, 2017).

While research suggests that schools that share the institutional contexts of the schools in our study tend to depress the postsecondary aspirations of students (Acevedo-Gil, 2018; Menas et al., 2016; Reddick, Welton, Alsandor, Denyszyn, & Platt, 2011; Taggart & Paschal, 2017) it is possible that the presence of the IB programme tends to raise teachers' expectations for all students not just IB participants. At Valley High, the entire English department was trained to teach DP literature classes,

expanding the number of teachers who were familiar with IB curricula at Valley. Previous research in a similar school context found that IB teachers who taught IB courses reported that they had increased expectations for their students as a result of joining the IB program (Mayer, 2006). Frequently these teachers report that before joining IB they never expected any of his students to turn in homework. But after becoming part of the IB team the teachers began to assign and collect homework from both IB and non-IB students. Teachers also said the IB curriculum and testing was more challenging than the regular curriculum they were using before they taught for IB.

College Aspiration. Finally, this study examined the impact of DP on college aspiration. College aspiration was measured by including in the survey a question regarding the highest level of education that a respondent planned to complete[9]. In 2016, of the 1,013 high school juniors in this study more than 15% of students responded that they did not have any college plans (13.3%) or had other plans (2.3%). In 2017, of the 609 seniors who responded to the survey, 568 students answered to this question, a total of 14% of students responded that they did not have any college plans or had plans other than college.

In predicting a student's college aspirations, after controlling for student characteristics, the results showed that students in IB programmes (both full Diploma and partial DP students) were more likely to have strong plans to obtain higher educational attainment compared to their non-IB counterparts in both their junior and senior years (see Table 5 and Table 6 for regression analysis results). In both years the magnitude was noticeable for full DP students in particular (Year 1: β=.65, p<.001; Year 2: β=.53, p<.01), and this difference was significant for partial DP students as well, although with a less strong effect (Year 1: β=.47, p<.005; Year 2: β=.42, p<.01).

[9] This variable is coded as follows: 1 high school graduation, 2 career school, 3 two-year community college, 4 four-year college or university, and 5 graduate or professional school.

Table 5

Regression Analysis Results on College Aspiration (Year 1 Survey Data)

Variables	β	SE	p value
IB participation (reference: Non-DP group)			
Full DP	.647	.100	.000*
Partial DP	.466	.108	.000*
Other	.244	.129	.059
Race/Ethnicity (reference: Hispanic/Latino)			
White	-.123	.140	.381
Black	-.534	.212	.012*
Asian	.049	.142	.728
American Indian	-.879	.347	.012*
Other/Multiracial	-.214	.119	.072
Home language - English	.058	.081	.473
Gender-male	-.243	.070	.001*
Self-reported GPA	.213	.038	.000*
Maternal education	.008	.038	.840
High school (reference: Lincoln HS)			
Valley HS	-.342	.103	.001*
Dominguez HS	-.170	.091	.062

Notes: Partial DP students: taking at least one DP course and planning to sit for at least one IB exam; Other: taking at least one IB course but no plan to sit for DP exams.
Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.
** Indicates the relationship is statistically significant at the $p<0.05$ level*

For students in Year 1, the results showed significant differences for African American and American Indian students compared to the reference group – Hispanic/Latino students (see Table 5). Specifically, African American students ($\beta = -.53$, $p = .012$) and American Indian students ($\beta = -.88$, $p = .012$) in this study tended to show lower college aspiration than their Latino peers did, and the differences were statistically significant. For Year 2 students, results did not indicate any significant differences across different racial groups and other demographic variables (see Table 6). This result may have been due to the limited variance in the year 2 sample, with the majority of students being Hispanic/Latino.

For both Years 1 and 2 models, another significant predictor was the self-reported GPA. Thus, students who received higher grades in high school were more likely to express higher postsecondary education plans, after controlling for the other covariates ($\beta = .21$, $p < .001$ for Year 1 and $\beta = .19$,

p<.001 for Year 2). Interestingly, in these samples, maternal education did not have a significant impact on students' postsecondary aspirations.

Table 6

Regression Analysis Results on College Aspiration (Year 2 Survey Data)

Variables	β	SE	p value
IB participation (reference: Non-DP group)			
Full DP	.526	.169	.002*
Partial DP	.424	.151	.005*
Other	.130	.161	.421
Race/Ethnicity (reference: Hispanic/Latino)			
White	-.124	.210	.556
Black	.394	.406	.333
Asian	-.154	.207	.456
American Indian	-.576	.567	.310
Other/Multiracial	-.074	.161	.647
Home language - English	.010	.109	.925
Gender-male	-.105	.098	.285
Self-reported GPA	.194	.055	.000*
Maternal education	.060	.052	.248
High school (reference: Lincoln HS)			
Valley HS	-.376	.153	.014*
Dominguez HS	.214	.147	.145

Notes: Partial DP students: taking at least one DP course and planning to sit for at least one IB exam; Other: taking at least one IB course but no plan to sit for DP exams.
Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.
** Indicates the relationship is statistically significant at the p<0.05 level*

Finally, in Year 1 and Year 2, this study found significant differences in students' college aspiration between Valley High and Lincoln High. Students at Valley High in general tended to express lower educational plans than their Lincoln High peers did. However, no statistically significant difference existed between Dominguez and Lincoln. These results likely reflect differences in how students experienced college advising in each of the three schools. After their junior and senior years, a noticeable difference existed between students at Dominguez High and Lincoln High (reference group) in their responses on college-advising questions (p=.002). Students at Dominguez in general had more positive college-advising support than their peers at Lincoln High did. However, no statistically significant difference emerged between Lincoln High and Valley High.

In interviews, many students said that their plans for a four-year college did not materialize and that they would be going to a two-year college. There seemed to be a relationship between their change in plans and not pursuing the full-diploma. Further explicating this and similar to previous research (Roderick, Nagaoka, Coca, & Moeller, 2009), our findings based on qualitative data indicate that IB students tended to attend less competitive colleges than they were qualified for because they misunderstood the financial aid packages offered by private schools and perceived it would be cheaper to attend a community college.

RQ 5: Are IBDP students from low-income backgrounds academically successful in college?

And

RQ6: How does the postsecondary academic performance and persistence of IB students from low-income households compare with similar non-IB students?

Descriptive statistics on IB students and non-IB students. In order to answer this line of inquiry, we analyzed the data of the freshman cohorts who entered the University of California (UC) between 2006 and 2008 and examined data for students who attended the IB programme during high school. We carefully created two groups of students based on programme participation: IB students and non-IB students[10]. Considering multiple factors, including descriptive statistics based on different cut-off numbers and feedback from IB officials, we included in the IB sample those student records that reported eight or higher number of IB semester course taken, planned, or in-progress. Students who reported less than eight IB courses taken, planned, or in-progress were grouped as non-IB

[10] The UC data report the total number of IB semester courses taken, planned, or in-progress in 10th, 11th and 12th grades. This broad reporting criteria encompass not only students who finished the programme but students who were in progress. The wide inclusion of IB students can dilute the actual effect of the programme; hence, we used a higher threshold to define IB students in this study.

students. Focusing on these two groups of students, the analysis included: (1) descriptive statistics for the two groups and (2) inferential statistics to explore the impact of IB participation on postsecondary academic outcomes (Please see Appendix C for more details regarding these analyses).

Inferential statistics on the impact of IB programme. We examined the IB programme impact on students' postsecondary academic performance by focusing on the following outcome variables: first- and second-year retention rates; four-, five-, and six-year graduation rates; and graduation GPAs (See Table 7). We also confirmed that IB students somewhat differed from non-IB students in covariate variables, including students' demographic variables and secondary-level academic outcome variables. Specifically, we included student's underrepresented minority status, first-generation college student status, family income levels, high school's API ranks, test scores (e.g., SAT and ACT), high school GPAs, number of AP courses taken, and number of A-G college preparatory semesters taken.

Table 7

Descriptive Statistics for Variables in the Study

Variables	**Non-IB Students (N=21,967) % or Mean (SD)**	**IB Students (N=670) % or Mean (SD)**
Underrepresented Minority	22.60%	20.30%
Average Income Level		
$0-5,3000	43.00%	36.70%
$53,001-106,000	27.80%	33.00%
$106,001-159,000	15.10%	16.90%
$159,001 or higher	14.10%	13.40%
First generation	40.60%	29.60%
High School API Rank (School level)		
Low	15.20%	13.20%
Medium	30.80%	42.20%
High	54.00%	44.60%
Average High School GPAs	3.78 (.38)	3.85 (.34)
Average SAT/ACT Scores	1699 (262.6)	1801 (234.2)
Average number of IB semester courses taken	.1 (.6)	13.7 (5.0)
Average number of AP semester courses taken	8.9 (5.2)	5.2 (4.9)
Average number of A-G college preparatory semesters	47.2 (7.9)	51.8 (9.5)
1st year retention rates	92.10%	93.40%
2nd year retention rates	85.50%	86.80%
4-year graduation rates	60.70%	62.60%
5-year graduation rates	80.70%	81.90%
6-year graduation rates	83.70%	83.90%
Average College Graduation GPAs	3.18 (.43)	3.23 (.43)

Source: University of California Office of the President (UCOP) data

Note: Graduation rates are based on the accumulated number of students graduating from UC. For instance, the number of students who graduated in five years includes the number of students who graduated in four years.

Average effects of the IB programme. The IB effects were estimated to be .031 for propensity-score matching (PSM) and .050 for nearest neighbor matching (NNM) on the first-year retention rates (see Table 8). In other words, the chance for IB students to continue the school for their sophomore year was 3.1 percentage points higher (PSM) and 5.0 points higher (NNM)

compared to their non-IB counterparts. Though the NNM result was significant, the average effect of the IB programme, from a practical standpoint, was very small. Regarding the second-year retention rates, the average IB effects were .052 (5.2 percentage points higher) and .070 (7 percentage points higher) for PSM and NNM analyses, respectively. Both results were significant, but the magnitude of the IB effects was rather small. With respect to graduation rates, we explored four-year, five-year, and six-year graduation rates. Note that students who graduated in six years include students who graduated in four and five years and that five-year graduation rates were calculated by including the accumulated number of students who graduated in four and five years. The average IB effects were .076 (7.6 percentage points higher) for PSM and -.096 (9.6 percentage points lower) for NNM on the four-year graduation rates. The NNM result shows that the IB effect was negative, which was surprising and inconsistent with the other results and would require further examination. However, for five- and six-year graduation rates, the NNM results indicate that the average IB effects were .098 (9.8 percentage points higher) and .078 (7.8 percentage points higher), respectively, and both results were significant. For PSM analyses, the average IB effects were positive but not significant on the five-year and six-year graduation rates. The magnitudes of the effects were .046 (4.6 percentage points higher) and .025 (2.5 percentage points higher), respectively (see Table 8).

Finally, we examined the IB programme effects on students' college graduation GPAs. The average IB effects were .075 and .028 for PSM and NNM analyses on graduation GPAs. The results were not statistically significant.

Table 8

Model-Based Estimation of IB Programme Effects (All students)

	PSM			NNM		
Outcome Variables / Population	Coefficient	95% CI	SE	Coefficient	95% CI	SE
First-year college retention	.031	(-.007, .069)	.019	.050**	(.018, .082)	.016
Second-year college retention	.052*	(.001, .102)	.026	.070**	(.028, .111)	.021
Graduation rates in four years	.076*	(.010, .143)	.034	-.096**	(-.152, -.040)	.029
Graduation rates in five years	.046	(-.012, .105)	.030	.098*	(.020, .176)	.040
Graduation rates in six years	.025	(-.033, .083)	.030	.078*	(.001, .155)	.039
Graduation GPAs	.075	(-.015, .165)	.046	.028	(-.022, .079)	.026

Note:†p < .10. *p < .05. **p < .01. ***p < .001.

URM Students Analysis Results: We then conducted the same analyses for underrepresented minority students (URM) only to explore the IB effect on URM students' academic performance (see Table 9). The average IB effects were estimated to be .060 (6 percentage points higher) and .092 (9.2 percentage points higher) for PSM and NNM results on first-year college retention rates. The results are also significant, implying that the students who completed IB courses seem to be more resilient than non-IB takers in terms of their freshman experiences. For second-year college retention rates, the magnitude for the NNM result increased, and the result was significant. However, the PSM result was not significant.

The average IB effects on four-year graduation rates were .023 (2.3 percentage points higher) and -.360 (36 percentage points lower) for PSM and NNM results, which shows conflicting results. PSM and NNM estimates showed contradictory results regarding four-year graduation rates for all students as well, which indicates that further examination of this association would be recommended in future analyses. Concerning five-year and six-year graduation rates, the average IB effects that NNM analyses produced were larger than the IB effects by PSM analyses. Specifically, the average IB effects on six-year graduation rates were .108 (10.8 percentage points higher) and .232 (23.2 percentage points higher) for PSM and NNM analyses, and the results were statistically significant. We found positive and significant IB effects on graduation GPA. The average effects of the IB impact on GPAs were estimated to be .163 (.163 GPA points higher) and .132 (.132 GPA points higher) for PSM and NNM analyses, respectively. Compared to the analyses for all students, the magnitudes of the average IB effects for URM students were found larger and more significant, implying a positive impact of the IB programme on URM students, in particular.

Table 9
Model-based Estimation of IB Programme Effects (URM students only)

	Propensity score matching			Nearest neighbor matching		
Outcome Variables / Population	Coefficient	95% CI	SE	Coefficient	95% CI	SE
First-year college retention	.060*	(.011, .110)	.025	.092**	(.036, .148)	.029
Second-year college retention	.036	(-.094, .167)	.067	.134***	(.066, .202)	.035
Graduation rates in four years	.023	(-.244, .289)	.136	-.360***	(-.459, -.261)	.050
Graduation rates in five years	.099†	(-.007, .204)	.054	.256*	(.032, .480)	.114
Graduation rates in six years	.108*	(.015, .201)	.047	.232*	(.010, .456)	.114
Graduation GPAs	.163*	(.030, .297)	.068	.132*	(.021, .242)	.057

Note:†p < .10. *p < .05. **p < .01. ***p < .001.

RQ 7: How prepared do IB students feel for the rigors of college coursework? And

RQ8: How do IB students from low-income households acclimate/integrate to college life? And

RQ9: What are the perceived key components of the Diploma Programme that best prepare students for the transition to college?

The IBDP: A preparation for college. Students who participated in IB (full IB Diploma and Course students) shared the perception that college was an easier academic experience compared to their IB high school experience. Survey data from both groups of students reflected a general consensus that participation in the IBDP course of study significantly impacted their college experience. We find that first generation students who attended high schools that served a majority of students from low income homes, experienced a type of heightened academic load in IBDP coursework. For IBDP students enrolled in college, the rigor and depth of the coursework, particularly writing assignments, prepared them well for the challenge of college coursework.

> It was good. I feel like IB did prepare me, because, like I said, because I just knew that we would see these assignments. They're either really similar, or easier sometimes. So you feel prepared. (Veronica, College student)

Repeatedly, interview participants compared the demand of their college courses as less than compared to their IBDP coursework. In some cases, students suggested college was easier than their high school experience. For example,

> So I found that IB made college work essentially a lot easier for me. And I think the most important thing that I learned was, when it comes to writing, and stuff, IB helps a lot. Because, for example, my second year, my first day of class, the teacher was talking, the professor was talking about, "Oh, we're gonna have an eight-page paper due in a month. You guys pick a topic." And there's people complaining, like, "Oh, an eight-page paper? That's a lot." To me, I was like, "Man, I had to do a 30-page paper in high school. It's easy! It's

> nothing! Give me the topic right now, I'll finish it, give it to you in two weeks. (Juan, college student)

Students agreed that their ability to write longer papers in high school also helped them apply to college and prepare them for their college level coursework. Many pointed to written and verbal assignments associated with the IBDP as particularly useful as preparation for college assignments.

> I feel that the IB programme gave me an advantage in my writing and communication skills as I have had lots of practice with public speaking and writing from assignments that I had to do back in my high school years. (Alicia, college)

For these first-generation college students, the writing demands of the IBDP in high school offered them exposure and practice with the written verbal and analytical demands of college. Notably, IBDP students shared their entry into the programme was a way to ensure they would receive quality education.

Results indicate that students who participated in the IBDP benefited from coursework that asked them to engage in deep, critical thinking as an integral practice to their learning. Many reported high school IB English and history classes required them to engage in deep conversations and written analysis. Students also pointed to the Theory of Knowledge course as particularly helpful as they engaged in "thoughtful and purposeful inquiry into different ways of knowing[11]" that challenged them intellectually. Students recounted how the IB curriculum was based on multiple perspectives required deep and meaningful questions based on multiple perspectives. This kind of inquiry, particularly when applied to writing assignment proved difficult at first for many students, but was an important learning milestone. For many, this kind of critical thinking influenced the way they analyzed and engaged in the world around them.

[11] IB (n.d.) What is TOK? Retrieved from https://www.ibo.org/programmes/diploma-programme/curriculum/theory-of-knowledge/what-is-tok/

> IB really emphasizes take control of your education and really ... Using yourself to get a better education, then just sitting back and just doing whatever everybody's telling you. I think that definitely played a role in how we were as leaders. We kind of took everybody's opinion in order to make a better educated decision, rather than just assuming that me knew what was best. I really think that IB had a big role in that. (Karla, college student)

Students we interviewed agreed that meeting the course demands of the IBDP helped prepare them for the academic expectations of college. Notably, students spoke of the herculean effort the IB programme demanded of individuals who had yet to experience the demands and rigor of the IBDP in their prior coursework. Students and school staff generally agreed that these demands contributed to the number of students that dropped out mid program. Students in this study related how the IBDP was a challenge but was a positive academic experience that helped them prepare for college.

It is notable that students in the study also pointed to the importance of IB teachers that not only helped them with course work but also college applications. The students in this study all shared a common experience of not being able to seek information about college and academic support from their parents. Students told stories of many teachers who really supported them during the IBDP.

> She would do extra stuff, like on weekends she would host study sessions right before the exams and those helped out a lot. Stuff like that, it was pretty genuine stuff that she did to help us out. And other teachers as well, they did study sessions and stuff like that, a lot of teachers did study sessions, some after school hours so I don't think they received any benefit out of it, it was just them doing what they thought was helpful for us. (Lando, college student)

Our data reveals the critical role teachers and counselors would come to play in the IB diploma programme particularly for students whose parents did not complete college. Students agreed how teachers and counselors adjusted their plans to include college application support for students. In

some cases, IB teachers would adjust coursework to help with college application preparation or counselors were assigned to work specifically with IB students on their college applications.

> The great thing about Mrs. Johnson was as the senior English teacher, she had a lot of knowledge on personal essays and the writing aspect of the application. She had assignments for us to do. You had to complete short little blurbs on a given topic in the hope that you found a topic that would help you write a better personal essay. They also would ... If you asked them, "Would you mind looking at my paper"? They would read your paper, give you feedback and really take the time to help you on a personal level to get the best essay you could write with the best experiences you had. (Karla, college student)

Interviews with students also revealed that that many students turned to peers for academic and social support. In particular, students asked their peers for help and we heard how students helped one another develop study skills. Additionally, college students recounted the stressful experience the IBDP had on their high school lives. Most of the interviews noted the intense nature of the IBDP and how they came to rely on their peer network for support.

> It was, sleepless nights, sometimes, but I'm glad that I had my Life Group, too, that I had them. We would Skype sometimes while doing work, because if not, we would fall asleep. Especially me, that I would come home from practice around 6:00 p.m., have dinner, and then, start homework right away. Or, I mean, at that time, I just wanted to sleep. But, like I said, we would Skype or something, and then, kind of keep each other in check. So that was good. I was really glad that I had someone, like, my life Group, also, to kind of go through this together. But, yeah, it was tough. It was tough, but at the same time, I'm glad I got to experience it. Because if not, I wouldn't know, this is what I was ... this is something that I could have done." (Veronica , college student)

In some schools, IB coordinators develop peer groups (e.g. Life Group) that provided an accountability system for students. Despite many challenges with the workload, students agreed that their experience with managing the IB programme along with their personal lives helped them effectively manage their time in college.

> We believe that what happened was IB definitely got us ready for the workload because high school we would be getting homework, maybe five to six hours of homework almost every night, depending on how you did it over the weekend… It was a lot of work, a lot of staying up late and making sure you finished everything and those habits definitely helped in college because in college, just like in high school, I don't find myself getting lazy. I don't find myself getting tired or being overwhelmed by the amount of work and the density of the content that we're being taught, especially in some majors. So IB definitely helped with not being overwhelmed and not ... it helped a lot with stress management I would say and pacing your time and understanding how you work. (Ajay, college student)

Research participants underscored the magnitude of the IBDP workload that not only challenged them academically but also required them to change their study skills and learning behavior in high school. Qualitative data from this study suggests students in the IBDP developed time management skills and the awareness to ask for assistance in their learning. In particular, students highlighted the study skills and particularly asking for assistance in the IBDP made it easier for them to study in groups or attend office hours with TA's and professors in college. For these students, the IB diploma programme helped prepare them for the rigors of college coursework particularly in the areas of writing, study skills and time management.

Interview data with students while they were in college reveals IB students from low income households that matriculate to college participate in study abroad at higher rates than comparable first-generation college students. IBDP students are uniquely positioned to participate in study abroad

program because of their academic and linguistic preparation. In particular, the IBDP was uniquely positioned to set up Spanish-speaking Latino students to participate in an academically rigorous program that builds on their linguistic capital. College students explained how they benefited from the IB language coursework especially when it allowed them to obtain college credit or place at a higher level of a foreign language.

> I really benefited a lot from the IB classes but especially the language aspect of it. My first semester, I was able to take a 300 level Spanish class on Spanish grammar composition. In doing so, I've already fulfilled the language credits that I'm going to need to graduate with one class. I was able to get enough back credit to have that fulfilled. The other thing that IB really did that helped me out my first semester, I came in with credit and so I'm already a technically a sophomore in standing. (Karla, college student)

Students agreed that being placed in higher foreign language classes facilitated their participation in a study abroad program.

Not surprising, the overwhelming majority of college students in this study balanced a full course load, participated in clubs and service with an added responsibility of work to earn money. Many students explained they developed time management skills in high school which seemed to help them manage busy college schedules that now often included working.

> I saw college for what it really was, just making your own schedule, and abiding by that. And the workload of it? Honestly, I think IB made the workload much easier for me in college because the amount of work they give you in high school is nothing compared to what they give you in college. Like, yes, you do you have your big papers, and you do have your big assignments. But they're at your own pace. (Juan, college student)

Students explained that the effort it took to balance their high school courses, complete the IBDP service requirement while applying to college was particularly stressful but an important milestone.

Our interviews with student reflected a varied experience among students with work. Most students reported working 10-19 hours, although a small portion shared working multiple jobs and working more than 40 hours a week. In the next section, we discuss the unique challenges that first generation students experience particularly when they come from homes where parents might also be struggling to make ends meet.

Discussion

The data in this study suggests first generation college going students felt well prepared to acclimate to the college life. In interviewing both high school and college students, we found that the IBDP students in this study believed they were well prepared for the academic and social demands of college. For college students in general, high self-efficacy is related to better college adjustment and particularly for underrepresented groups (Ramos-Sanchez & Nichols, 2011). Looking at the data as a hole, we suggest that IBDP students who are the first to attend college in their families are more successful and likely to graduate college (even after 4 years) when their high schools provide targeted academic and social support systems.

The survey data from this study demonstrates that IBDP students have a strong desire to attend and enroll in college, but not that different to the non-IBDP students at their school. Qualitative data captured at both the high school and college level suggests that many of the first-generation students used the IB diploma programme as a pathway to college. Students commonly shared how their parents sought the IB programme for their children as early as 8th grade because of its college preparation emphasis. In other cases, students knew they wanted to go to college and were often persuaded by IB coordinators and counselors to try the IBDP. Given the selection bias of any intervention program like IB, we suggest that IBDP students generally shared the perception that the IBDP would help prepare them for college and focus on the perceived key components of the Diploma Programme that best prepare students for the transition to college.

In particular, IBDP students underscored the academic and social demands of the programme as well as the social network they received as IB students. In line with the body of research that explores how a college going culture can help facilitate first generation students' successful transition to college (Allen, Kimura-Walsh, & Griffin, 2009), our research finds that the IBDP provides students with a rigorous curriculum and a college-going environment. Key studies in education have

found the importance of 1) academic momentum; 2) an understanding of how college plans develop; 3) a clear mission statement; 4) comprehensive college services; and 5) coordinated and systemic college support as the five elements that are central to the establishment of a successful college-going culture (Corwin & Tierney, 2007). In interviews, students shared how their high schools promoted a college going culture amongst the staff and students within the IB diploma programmes through academic rigor, support for personal study and organization skills and a social network of adults and peers to assist with college applications. The students in this study noted that the decision to participate in the IBDP was significant because of a general understanding that the IBDP would help them apply and acclimate to college. In general, IBDP students' high sense of self efficacy in both high school and college seemed in part attributed to their experience with the IBDP.

For these first-generation students, the IBDP provided a challenging academic experience for students in an effort to help prepare them for the challenge of college coursework as well as the personal responsibility they would need to successfully matriculate to college. Students shared countless stories of the support systems they developed to meet the demands of their coursework and apply to college. Our data shows high schools with IB Diploma Programme developed these support systems in various ways not limited to peer groups, extra-curricular clubs, assigned counselors, peer buddy systems and alumni events where former IB students offer critical perspective about transitioning from IB to college. IB teachers agreed that developing an IB programme tailored to first generation students required them to support students in both their academic and social development. In a college-going culture, adults and students hold the values, beliefs and expectations that college readiness requires effort and persistence (Oakes, Rogers, Lipton, & Morrell, 2000). Each school seemed students in this study agreed that the IBDP helped them develop the personal study skills as well as develop a social network often made up of peers and school staff throughout their high school

years. In their estimation, the IBDP experience helped them get acclimate to college because it provided critical skill development useful to their postsecondary schooling.

All schools, but urban schools in particular, must place close attention to creating a college culture that is inclusive of a multicultural identity, so that first-generation students do not feel alienated by the college going culture program (Oakes, 2003; Oakes, et al., 2000). There is great potential in using the IBDP with Latino, Spanish speaking high school students particularly because of its assets-based, additive approach to language and its focus on critical analysis (Aldana & Mayer 2014). This study finds that for the Latino, Spanish speaking students enrolled in the IB diploma programme certainly drew on their linguistic capital. In our college student sample, we did find that some high schools have developed ethnic studies courses as their curriculum. In these cases, IB classes in history served as spaces of critical analysis with a focus on the Latino experience.

> My favorite would be, in terms of enjoying going to the lectures is ethnic studies. That's my favorite because I really enjoy history myself, personally. That was my favorite IB class in high school, history of America. (Edwin)

However, our data mostly reveals a lack of culturally relevant content or connections made to Latino students' culture with the exception of a heroes and holidays approach utilized in high school Spanish courses. We hoped to find more evidence of pedagogical approaches that would draw from the cultural wealth of the Latino student experience but these were isolated experiences. In light of the research on culturally relevant pedagogy (Martinez, Morales & Aldana 2018) we suggest IB coordinators and teachers examine the IB programmes at their school and assess if they might be able to better serve their majority, Latino student population employing a culturally relevant pedagogy.

In order for the IBDP to best serve first generation college-going students, schools must be able to provide target support and resources to its students. The IBDP students in our study strongly agreed on the importance of social supports in the form of teachers and counselors in high school as

well as peers. Educational studies have focused on the development of social capital in school settings and its positive impact on underserved students (Gibson, Gándara, & Koyama, 2004; Stanton-Salazar, 2001). Studies as far back as the Coleman Report (1966) have documented the importance of peers on student outcomes and peers with higher academic aspirations are a critical resource in any school. Our data shows how high school IB teachers and coordinators understood the effort the IBDP required of first generation and adapted the IBDP for their students. Specifically, students shared how they learned to ask for help from the network of support in their IB programme.

We argue that IBDP students developed critical skills throughout their high school years in response to the rigorous curriculum prompted by the IBDP as well as the social support systems students would learn to depend on as they navigated challenging coursework and intense workloads. We suggest the IBDP prepared these first-generation students to endure real challenges and persist through college. Latino IBDP students particularly in high schools where the college-going culture was strong, reflected a *college-conocimiento,* the process where Latinx students reflect on the college information that they receive, in relation to their intersectional identities when preparing for college. The pathway of *college-conocimiento* entails seven cyclical spaces and aims for students to develop a reflective college consciousness, exemplified through self-advocacy and supporting peers with the college choice process (Gil, 2017). Interviews with high school students over time demonstrated a growing college-*conocimiento* given the college advising they received via their high schools.

Not surprisingly, college students reflected how their IBDP experience helped them overcome any challenge they might face in college. Based on our longitudinal sample, participants maintained this level of optimism as they faced a multitude of personal, financial, family and academic problems. Despite these challenges, IBDP college students believed that they would be able to overcome any issue because they had learned to ask for help when they needed it. In other words, these students seemed to have extended the skills developed as college-*conocimiento* to the college campus where

they used self-advocacy and supportive peers to persist through college. The college students in this sample indicated they practiced self-reflection of their learning environment as they persisted through college. Many spoke of realizing that their current college experience was not a good match and thus sought advising and support to help them transfer to their other institutions. Upon closer analysis of the UC data, it is not surprising to see an IB effect on students' graduation rates for college students who graduated in 5 or 6 years. The IBDP college students were very aware of the importance of a network to help them navigate their studies post IBDP. Several former IBDP students could identify professors and advisers on their college campus that had helped them if they had questions or an issue. In line with the research to the retention of Latino/a college students, data indicate that students with an advisor/mentor consistently have higher levels of institutional commitment, satisfaction with faculty, academic integration, cultural affinity, and encouragement. (Nora, Kraemer, & Itzen 1997; Torres 2006).

First-generation students often possess other demographic and enrollment characteristics (low socioeconomic status and lower enrollment intensity, among others) that are associated with dropping out. An extensive body of research indicates that students whose parents have not attended college often face significant challenges in accessing postsecondary education, succeeding academically once they enroll, and completing a degree (e.g., Ishitani 2006; Pascarella et al. 2004; Woosley & Shepler 2011). Our results suggest that first-generation students more frequently encounter obstacles that compromise their academic success as compared to non-first-generation students, such as job responsibilities, family responsibilities, perceived weak English and math skills, inadequate study skills, and feelings of depression.

We cannot underscore the magnitude of the challenges the students in this study have faced as they continue their postsecondary education. For these IBDP students, the academic and social experiences in high school often occurred in the context of extreme poverty and personal challenges

students from low income families often face. Our qualitative data show that these students persisted through college (even transferring campuses) and developed the "pluriversality" to ask for assistance from a network of supportive individuals (Hallett & Venegas, 2011). Students often referred to their IB experience as the first place they learned to ask others for academic support.

> I'm definitely not afraid to speak up in class or too ask a question, or go see a professor during their office hours. The majority of the teachers that I've interacted with, here on the college campus, really like a student who is taking that extra step, who has the initiative to get a better understanding to do well. I do not think that if I hadn't been in IB that I would still be willing to take that step. (Karla, college student)

For many of the students in the study, the IB diploma programme helped them develop interpersonal skills critical to their academic identity. This "pluriversality" would become helpful to those that continued their postsecondary studies.

RQ 10. What challenges do IB students from low-income households face as they transition to college? What additional supports would better facilitate this transition for IB students?

The voices of college students in this study provided us an in depth look at what it means for students to have experienced such a rigorous program like the IBDP in schools that would not typically provide such an intense learning experience. We provide four case studies of IBDP students currently enrolled in college to highlight the kinds of challenges these first-generation students form working class backgrounds often face. These data are presented as cases to demonstrate the array of individual experiences and contextual phenomenon across the ten students in the study (Stake, 1995). We selected these particular case studies because they each represent similar issues we found across participants. The stories of these students demonstrate how the IBDP influenced these students' ability to overcome adversity and persist through college. Through the case studies, we highlight what kinds of supports are particularly useful for first-generation students as they transition to college.

Aaliyah[12]. Aaliyah attends Ocean City College. She participated in the IBDP in a high school concentrated in a high poverty region. Her high school did not have a specific college advising program so she relied heavily on mentors at her high school that she met through the IB diploma programme. She enrolled in a small private college; a historically black college or university (HBCU) that was out of state and across the country. She selected this school at the last minute after two other colleges did not provide the financial aid package she originally expected from them. Her family was not able to help guide her through the college selection process so she relied on her mentors. Once she started at the HBCU, her familial responsibilities increased as her mom got sick.

[12] All names of individuals and colleges/universities are pseudonyms.

> Yeah, so the reason why I came back home was because staying out of state was very expensive and the school that I was going to, it was ridiculous. It was crazy and at the time, my mom was sick, so it was just too many reasons for me to come home and not enough reasons for me to stay, so that's why I made the decision to come back home. (Aaliyah)

Meanwhile, Aaliyah struggle financially as an out of state student. She opted to not return after the first year. Given that she had only competed 24 units, she was not able to transfer to any of the state colleges in her hometown in California. She has attended two different community colleges and has plans to transfer to a local state university. She sees her experience in the IBDP as a motivating factor for her to continue her studies through graduate school.

Penelope. Penelope migrated to this country when she was in elementary school. Her parents enrolled her in school and as the eldest of five siblings she noted the importance she placed on her familial network. She enrolled in an IB diploma programme at a high school even though the school had a "bad reputation" and was in a high poverty community because her parents heard it was a rigorous and elite academic program. She attends the University of California and is on track to graduate this spring after a more than. 2-year break. Initially when she enrolled in college, she struggled with her classes and eventually was dismissed. Initially, Penelope did not tell anyone of her academic issues in college and did not seek any support or information on her options. Eventually, she sought counseling and therapy. When she was no longer a student, she still went to classes to make sure she knew what kinds of classes she would enjoy. She eventually sought assistance from people at her university and worked to get re-admitted. She describes how her IB experience provided her some motivation to persevere.

> Eventually, I got back into working on the readmission requirements. I kind of fought through and just kind of kept remembering my journey from coming in here to Riverside at a very young age, struggling to speak, how to learn English and how to write it and all. Till this day,

> I still struggle a little bit, you know, but through elementary, middle school, high school, I was like all this- I'm thinking so negative. And so eventually I started opening up and then it really helped me out a lot. Now I feel greater to be sharing this story, because you know what? I ended up persevering and just kept working hard. I think that's a skill or almost, I'm not sure that skill is the right word, but it's something you learn. As you're experiencing the [IBDP] programme through the high school years, you kind of just… it reminds you like, "Hey, you survived through these years. Anything else that comes at you, you should be able to go through it and survive." Even though, yeah, you failed one time in one class, it doesn't mean you're a whole life failure. (Penelope)

Penelope's words reflect the perseverance the IBDP students we spoke to in this study. Her postsecondary schooling experience demonstrate how first-generation students in the IB diploma programme become equipped with skills motivating them towards college completion. Despite academic struggles, Penelope's IBDP experience helped her develop the perseverance that would help push her towards college completion.

Ajay. Ajay attends the University of California and will graduate with a degree in engineering after 4 years. He is the first one in his family to attend college and participated in an IB diploma programme at his high school. His parents emigrated from India to the United States and he grew up speaking a combination of Urdu and English. Upon enrolling in college, Ajay identified immediately that he would need another support network to help him acclimate and excel in college, just like his IBDP experience helped him receive a rigorous education in high school. He applied to the TRIO program his freshman year which would eventually provide him with academic advising support throughout his college career. His college experience was significantly improved with the network of support he received in the TRIO program particularly because his major typically pushes out

students. When asked what unique qualities might have helped him persist in college, he highlighted the communication skills he developed through this IBDP experience.

> I would say what really helps me stand out is my ability to understand and communicate people at a level that they feel that they've, you know, they feel like they're being heard and that somebody's actually listening to them. I feel like a lot of engineers and people in STEM generally lack this ability of being able to effectively communicate. And I feel like in my time at UC, in my classes, working in projects, working in teams, doing research, I found time and time again that I've always had a ... found it easy to stand out and take positions of leadership because of my ability to not only understand things from a technical level but also be able to explain it in a non-technical way to people who aren't from a technical field. So working on projects, we're not always working with people from STEM. There's different fields working on a singular project. So for example, business. I was in a competition for research where I had to build a device, and we entered a business competition, and we had to present. And all those skills of the presentation, communication, networking, all of that essentially kind of helped me realize that it's not just the technical skills that matter, but also communication needs to go hand in hand with those technical skills in order to make you really a true good engineer I guess in the end. Because if you understand everything perfectly, that's great, but if you can't articulate your ideas, and you can't talk to people and help them understand where you're coming from, or your point of view on topics, then it doesn't really help in the end. So I think that's what really makes me stand out. (Ajay)

Veronica. Veronica attends the University of California and is on track to graduate within four years. She and her parents migrated here from Mexico. Her father works in a factory and her mother is a stay-at home and continues to care for Veronica's younger siblings. Veronica went to high school with an IB programme because her parents wanted her to continue developing her

linguistic abilities in Spanish. During the college selection process, Veronica's status as an undocumented student suddenly impacted her selection criteria. As Veronica explained, one of the universities she applied to and was originally her first choice did not provide her the financial package she had hoped for. Given her undocumented status, Veronica's transition and acclimation to college was impacted by her DACA status. As a result, she chose the University of California because they were able to support her financially and the institutions provided support to her given her unique circumstances. For Veronica, transitioning to college was made easier by her participation in the IBDP but she still faced challenges by some of her circumstances (DACA status).

> I feel like IB did prepare me, because, like I said, because I would see these assignments- they're either, really similar or easier sometimes; so you feel prepared in what you're doing. And even if they're a little bit harder, it's not a drastic change, so I like that. Life at [University of California] was different. It was a lot different, because I was, like I said, I'm really close with my family. So it was kind of, being on your own, that is a little different. But it's, like I said, since I was organized, and I knew when to do my things, and kind of stay on task, it wasn't as hard. It was like, the staying away from my siblings that was hard, because I was really close to them. And if, only calling them, or I would visit often, but I would try to come home at least every weekend, at least for a day or two, if I didn't have more time. And yeah, I would kind of talk to them, ask them how their thing is going, do you think you need help with anything? But, like I said, it was different.

Veronica shared that her DACA status initially made her not apply to any out of state schools because she would not be able to pay for them. Additionally, she explained how important her family was to her and given their legal documentation status, she wants to remain close to or live at home. In particular, she noted how much she wanted to help her parents care for her younger siblings particularly when it came to school. She lives at home and commutes long hours to campus.

Interestingly, Veronica's IBDP experience has influenced her to continue her graduate studies in education and wants to work in a dual immersion school.

Recommendations for Further Research

Longitudinal data sets that include significant numbers of IB students grade 7 through post-secondary education should be developed. For example, Educational Longitudinal Survey (ELS) ELS 2002 does not differentiate between AP and IB courses. IBO should advocate for changes to these data systems so that scientifically valid predictive studies can be conducted. Causal inference is very difficult to determine using the data that is currently available in data sets that are not longitudinal. In addition, IBO should partner with large school districts to conduct both qualitative and quantitative research so that an in depth understanding of the contexts that produce student outcomes can be understood.

Conclusions

Research Questions	Summary of Findings
1. How do Diploma Programme students from these high schools describe their experience in the programme?	Students were generally positive about their classroom experiences. Students were very appreciative of the care and social emotional support they received from teachers. Students benefited from the social networks they experienced. While students seemed to think they had obtained sufficient college advising to make informed decisions about the transition to college, our analyses suggest that their knowledge regarding college was incomplete. Students appreciated the individual attention from the DP coordinators at the suburban and urban school.
2. How does the high school academic performance of DP students compare to their non-DP peers?	Findings from the University of California data set suggest DP students outperform their non-DP peers on high school GPA and SAT scores.
3. How do DP students from these high schools perform on measures of student engagement and motivation?	Year 1 and Year 2 student survey data indicate that DP students were more likely to have more positive academic experiences in the classroom and more positive college advising experiences than their non-IB peers.

4. What are the aspirations of DP students? How do the aspirations of DP students from low-income households compare to those of similar non-DP students?	Survey data suggest DP students' college aspirations were moderately higher than those of non-IB peers, in both junior year of high school (Year 1) and senior year (Year 2). Qualitative data suggest IB students had high aspirations, but their knowledge about college lacked specificity. Qualitative data also indicate that DP students' college aspirations declined over time as the reality of financial obligations set in, during their high school senior year.
5. Are IB Diploma Programme students from low-income backgrounds academically successful in college? a. How do Diploma Programme graduates perform in college courses?	We found positive and significant IB effects on five- and six-year college graduation. Compared to the analyses for all students, the magnitudes of the average IB effects for URM students became larger and more significant, implying a positive IB program impact on URM students, in particular.
6. How does the postsecondary academic performance and persistence of IB students from low-income households compare with similar non-IB students?	The impact of the IBDP on the postsecondary persistence of IB students from low income households was significant, when compared to non-IB students of similar background. The impact of the IBDP was also significant on graduates from similar backgrounds who graduated in 5 or 6 years.
7. How well-prepared do IB students feel for the rigors of college coursework?	IB students agreed their IBDP experience helped prepare them for the academic rigor of college. Students specifically felt the IBDP helped them develop strong writing skills and study skills.
8. How do IB students from low-income households acclimate/integrate to college life?	IB students shared the belief that they would be able to acclimate and integrate to college because the IBDP had helped them develop strong social networks they could rely on when needed. Most students were involved in college clubs and were more likely to participate in study abroad programs.
9. What are the perceived key components of the Diploma Programme that	High school and college students identified three critical components of the IBDP experience that helped them transition to college: 1) academic rigor through critical analysis as demonstrated through verbal assessments; 2)

best prepare students for the transition to college?	social network of individuals that could provide academic/college advising and socioemotional support and 3) increased workload prompted students to develop study and time management skills.
10. What challenges do IB students from low-income households face as they transition to college?	IBDP students from low-income households face a range of challenges throughout their transition to college. In particular, first generation students face familial responsibilities, financial hardship, academic disengagement as well as personal circumstances (legal status) that can impede or delay their college completion.

Recommendations

Students and families	Teachers, counselors, school leaders, school districts	International Baccalaureate
Students and families should ask questions about the transition to college early and often. Families should discuss career options with their children. Families should seek information from their local school regarding college financial aid. Families should provide timely and regular feedback to schools and teachers regarding how well they feel their child is doing in school.	Professional development for teachers that centers on student efficacy, deficit discourse and importance of assets-based pedagogies. Teachers engage in student-centered instruction where students feel valued, challenged and respected in classes. Teachers should increase the amount of integration between college, career, and the curriculum in courses. Counselors help students construct academic identities that incorporate gender, race/ethnicity, social class, and/or first-generation status as students consider college. All staff aim to bridge family, friends, and academic worlds for students, helping them develop resiliency and avoiding feeling marginalized or between worlds. Administrators develop a social structure on campus to support first generation/low income students as they consider/participate in the IBDP. Administrators should seek funding to support a full-time IB coordinator, a part-time MYP coordinator, and a full-	IB's 5-year review study teams should receive professional development around culturally relevant pedagogy and how that looks at implementation in the schools and classrooms. The IB should work on making the IB's Equity and Excellence Framework recommendations in all schools starting with high poverty schools. The IB should provide guidance to schools on integrating some aspects of the AVID college advising program into the IB programme model. Extended Essay topics for example could be focused on students' career exploration, financial aid and college transition issues.

	time support staff person. Administrators and counselors should work together to support AVID and IB partnerships to increase students' preparation for college. District administrators should elicit feedback from students, parents and teachers around issues of school culture, college advising, and social emotional engagement of students.	

References

Abadie, A., & Imbens, G. W. (2006). Large sample properties of matching estimators for average treatment effects. *econometrica, 74(*1), 235-267.

Abadie, A., & Imbens, G. W. (2012). Bias-corrected matching estimators for average treatment effects. *Journal of Business & Economic Statistics*.

Acevedo-Gil, N. (2017) College-conocimiento: toward an interdisciplinary college choice framework for Latinx students, *Race Ethnicity and Education*, 20:6, 829-850, DOI: 10.1080/13613324.2017.1343294.

Acevedo-Gil, N. (2018). New Juan crow education as a context for institutional microaggressions: Latina/o/x students maintaining college aspirations. *Urban Education*, 1-29. DOI: 10.1177/0042085918805152.

Aldana, U.S. and Mayer, A. (2014). The International Baccalaureate: A college-preparatory pathway for heritage language speakers and immigrant youth. In R. Callahan & P. Gándara (Eds.), The Bilingual Advantage: Language, Literacy and the US Labor Market? Multilingual Matters.

Bowers, A.J. (2016) What do Teacher Assigned Grades Measure? A One Page Research Summary. Teachers College, Columbia University: New York.

Clark, C., B. Scafidi, and J.R. Swinton. (2012). Does AP Economics improve student achievement? *American Economist* LVII*(1)*:1-20.

College Board. (2017). Summary reports: 2017. Retrieved from http://www.collegeboard.com/student/testing/ap/exgrd_sum/2017.html

Conger, D., M.C. Long, and P. Iatarola. 2009. Explaining race, poverty, and gender disparities in advanced course-taking. *Journal of Policy Analysis and Management* 28*(4):* 555-76.

Dennis, J. M. & Phinney, J. S. & Chuateco, L. I. (2005). The Role of Motivation, Parental

Support, and Peer Support in the Academic Success of Ethnic Minority First-Generation College Students. *Journal of College Student Development* 46(3), 223-236. Johns Hopkins University Press.

Esposito, C. & Mayer, A. (2014). *Do Advanced Placement Courses Provide a More Rigorous High School Experience? (ELS 2002).* Paper presented at the 2014 annual meeting of the American Educational Research Association. Retrieved April 25 2018, from the AERA Online Paper Repository.

Gándara, P. (2002). A study of high school Puente: What we have learned about preparing Latino youth for postsecondary education. *Educational Policy*, *16*(4), 474-495.

Gándara, P. & Aldana, U. S. (2014). Who's Segregated Now? Latinos, Language, and the Future of Integrated Schools. Educational Administration Quarterly 50 (5) 735-748.

Geiser, S. & Santelices, V. (2004). The role of Advanced Placement and honors courses in college admissions. Berkeley, CA: *Center for Studies in Higher Education, University of California, Berkeley.* Retrieved from http://professionals.collegeboard.com/profdownload/the-role-of-ap-and-honors-courses-in-college-admissions.pdf

Goyette, K. A. (2008). College for some to college for all: Social background, occupational expectations, and educational expectations over time. *Social Science Research*, *37*(2), 461-484.

Guo, S., & Fraser, M. W. (2010). Propensity score analysis: Statistical methods and applications. London: Sage: Thousand Oaks.

Hallett, R. E., & Venegas, K. M. (2011). Is increased access enough? Advanced placement courses, quality, and success in low-income urban schools. *Journal for the Education of the Gifted*, *34*(3), 468-487.

Hill, N. E., & Wang, M. T. (2015). From middle school to college: Developing aspirations,

promoting engagement, and indirect pathways from parenting to post high school enrollment. *Developmental Psychology*, *51*(2), 224-235.

International Baccalaureate (IB). (2019). Diploma Programme. Retrieved from https://www.ibo.org/programmes/diploma-programme/

Institute of International Education. (2018). Profile of US Study Abroad Students 2005/6 – 2016/17. Open Doors Report on International Educational Exchange. Retrieved from https://www.iie.org/opendoors.

Ishitani, T.T. (2006). Studying Attrition and Degree Completion Behavior Among First-Generation College Students in the United States. *Journal of Higher Education*, 77(5), 861–885.

Johnson, S. (2019). Where teachers thrive. Organizing schools for success. IHarvard Education Press: Cambridge.

Kelly, S. (2008). What types of students' effort are rewarded with high marks? *Sociology of Education 81*, 32-40.

Kettler, T., & Hurst, L. T. (2017). Advanced academic participation: A longitudinal analysis of ethnicity gaps in suburban schools. *Journal for The Education of the Gifted*, *40*(1), 3-19. Doi: 10.1177/0162353216686217

Klugman, J. (2013). The Advanced Placement arms race and the reproduction of educational inequality. *Teachers College Record*, *115*(5), 1-34.

Longwell-Grice, R., Adsitt, N.Z., Mullins, K. & Serrata, W. (2016) The First Ones: Three Studies on First-Generation College Students. *NACADA Journal*, 36(2) 34-46.

Luo, S. (2013). The effects of Advanced Placement and International Baccalaureate Programs on student achievement. (Unpublished doctoral dissertation. California State University, Stanislaus.)

Martinez, D., Morales, P. & Aldana, U.S. (2017). Leveraging Communicative Repertoires Using classroom discourse analysis as a tool for equitable learning. *Review of Research in Education. 41(1),* 477-499.

Mayer, A. (2006). Interrupting social reproduction: The implementation of an International Baccalaureate Diploma Program in an urban high school. Unpublished doctoral dissertation. University of California, Davis.

Means, D. R. & Clayton, A. B. & Conzelmann, J. G. & Baynes, P. & Umbach, P. D. (2016). Bounded aspirations: Rural, African American high school Students and college access. *The Review of Higher Education* 39(4), 543-569. Johns Hopkins University Press.

Pascarella, E.T., Pierson, C.T., Wolniak, G.C., and Terenzini, P.T. (2004). First-Generation College Students: Additional Evidence on College Experiences and Outcomes. *The Journal of Higher Education,* 75(3): 249–284.

Perna, L. W., Rowan-Kenyon, H. T., Thomas, S. L., Bell, A., Anderson, R., & Li, C. (2008). The role of college counseling in shaping college opportunity: Variations across high schools. *The Review of Higher Education*, *31*(2), 131-159.

Perna, L. W., May, H., Yee, A., Ransom, T., Rodriguez, A., & Fester, R. (2015). Unequal Access to Rigorous High School Curricula: An Exploration of the Opportunity to Benefit from the International Baccalaureate Diploma Program (IBDP). *Educational Policy*, *29*(2), 402-425. 10.1177/0895904813492383.

Ramos-Sánchez, L. and Nichols, L. (2007), Self-Efficacy of First-Generation and Non-First-Generation College Students: The Relationship with Academic Performance and College Adjustment. *Journal of College Counseling*, 10: 6-18.

Reddick, R. J., Welton, A. D., Alsandor, D. J., Denyszyn, J. L., & Platt, C. S. (2011). Stories of

success: High minority, high poverty public school graduate narratives on accessing higher education. *Journal of Advanced Academics,* 22(4), 594-618.

Robbins, B. M. (2012). "People Like Us Don't Go There": Local culture and college aspirations in rural Nebraska. *Yale Journal of Sociology*, *12*, 98-129.

Rowland, M. L., & Shircliffe, B. J. (2016). Confronting the "acid test": Educators' perspectives on expanding access to advanced placement at a diverse Florida high school. *Peabody Journal of Education*, *91*(3), 404-420.

Rubin, D. B. (1997). Estimating causal effects from large data sets using propensity scores. Annals of internal medicine, 127, 757-763.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). Experimental and quasi-experimental designs for generalized causal inference. Belmont, CA: Wadsworth Cengage Learning.

Shah. S., Dean, M. & Chen, Y.C. (2010). Academic performance of IB students entering the University of California System from 2000-2002. Geneva: IBO.

Shaw, E. J., Marini, J. P., & Mattern, K. D. (2013). Exploring the utility of Advanced Placement participation and performance in college admission decisions. *Educational and Psychological Measurement,* 73, 223–253. doi:10.1177/001316441245429.

Stake, R. E. (1995). The art of case study research. Thousand Oaks, CA: Sage

Stebleton, M, & Soria, K. (2013). Breaking down barriers: Academic obstacles of first-generation students at research universities. *The Learning Assistance Review*. Retrieved from the University of Minnesota Digital Conservancy, http://hdl.handle.net/11299/150031.

Taggart, A., & Paschal, J. (2017). The influence of equitable treatment on Latina/o high school students' college aspirations. *Journal of Latinos and Education*, 1-12. DOI: 10.1080/15348431.2017.1390465

Torres, V., & Hernandez, E. (2009). Influence of an Identified Advisor/Mentor on Urban Latino

Students' College Experience. *Journal of College Student Retention: Research, Theory & Practice,* 11(1), 141–160. https://doi.org/10.2190/CS.11.1.h

Wang, M.-T., Willett, J. B., & Eccles, J. S. (2011). The assessment of school engagement: Examining dimensionality and measurement invariance by gender and race/ethnicity. *Journal of School Psychology, 49,* 465–480, doi.org/10.1016/j.jsp.2011.04.001.

Welton, A. D., Diem, S., & Holme, J. J. (2013). Color conscious, cultural blindness: Suburban school districts and demographic change. *Education and Urban Society*, 47, 695–722. doi:10.1177/0013124513510734.

Wildhagen, T. (2012). How Teachers and Schools Contribute to Racial Differences in the Realization of Academic Potential. *Teachers College Record*, *114*(7), http://www.tcrecord.org/Content.asp?ContentId=16469.

Witenko, V., Mireles-Rios, R., & Rios, V. M. (2017). Networks of encouragement: Who's encouraging Latina/o students and white Students to enroll in honors and Advanced-Placement (AP) Courses? *Journal of Latinos and Education*, *16*(3), 176-191.

Woosley, S.A., and Shepler, D.K. (2011). Understanding the Early Integration Experiences of First-Generation College Students. *College Student Journal,* 45(4): 700–717.

Young, J. L., Ero-Tolliver, I., Young, J. R., & Ford, D. Y. (2017). Maximizing opportunities to enroll in advanced high school science courses: Examining the scientific dispositions of black girls. *Journal of Urban Learning, Teaching, and Research*, *13*, 174-183.

Appendices

Appendix A: Participating High Schools with IBDP

Table 1: Participating IBDP High Schools

School	Dominguez High School	Valley High School	Lincoln High School
Type	Suburban	Rural	Urban
Population	2144	2544	2319
Career Programs	CTE Programs in 2017-2018 Agricultural Business Pathway Agricultural Mechanics Pathway AgroSciences Pathway Automotive Pathway Business Management Pathway Child Development Pathway Food Service and Hospitality Pathway Ornamental Horticulture Pathway Plant and Soil Science Pathway Professional Sales Pathway Residential and Commercial Construction Pathway Systems Diagnostics, Services, and Repair Pathway ROP Auto Beginning ROP Computer Information System ROP Construction Tech ACAD ROP Construction 2 ACAD ROP Construction Tech ROP Retail ROP Store ROP Store Lunch	Vocational Education, today's CTE programs are rigorous and relevant programs that combine academic knowledge with technical skills and application of learning in hands-on, real-life contexts to prepare students with viable skills for today's increasingly complex workforce. Valley City Schools operates over 30 distinct CTE/ROP programs spread across its seven comprehensive high school sites/ancillary facilities. These programs provide workplace preparation to our high school students, including several programs specifically designed to provide training to students with special needs, as well as workforce training for adults in the community. CTE programs reflect the instructional and learning design of Common Core: problem or project-based learning, development of critical thinking and problem-solving skills, teaming/collaboration and increased awareness of the expectations of business, industry, and the workplace.	CTE Programs Including: Biotechnology Design, Visual and Media Arts Engineering Technology Entrepreneurship/Self-Employment Environmental Engineering Family and Human Services Games and Simulations Legal Practices Networking Production and Managerial Arts Professional Sales Public Safety Software and Systems Development

CTE Program Participation			
# of students participating	798	934	765
UC Approved Courses			
% Students Enrolled	99.1	96.7	No Info Found
%Students Completed All Courses	39.2	45.7	No Info Found

Student Enrollment by Groups	Dominguez	Valley	Lincoln
Black or African American	1.4	2.5	9.5
American Indian or Alaska Native	0.1	0.4	0.6
Asian	1.8	8.6	5.6
Filipino	0.4	0.4	0.3
Hispanic or Latino	91.3	71.8	73.2
Native Hawaiian or Pacific Islander	0.1	0.3	0.6
White	4.5	11	9.1
Two or more races			1.1
Socioeconomically Disadvantaged	91	80.5	91.2
English Learners	33.9	11.4	12
Students with Disabilities	10.4	11.5	10
Foster Youth	0.5	0.2	1.5

Appendix B: Student Survey

PANORAMA EDUCATION

Page 1

0

Student Survey

Perceptions of School

Please give us your opinions about this school in general so that we can better understand your experiences.

1. How excited are you about going to your classes?

Not at all excited | Slightly excited | Somewhat excited | Quite excited | Extremely excited

2. In your classes, how eager are you to participate?

Not at all eager | Slightly eager | Somewhat eager | Quite eager | Extremely eager

	Almost never	Once in a while	Sometimes	Frequently	Almost always
3. How often do you get so focused on activities in your classes that you lose track of time?					
4. When you are not in school, how often do you talk about ideas from your classes?					

5. Overall, how interested are you in your classes?

Not at all interested | Slightly interested | Somewhat interested | Quite interested | Extremely interested

Learning

In this section, we would like for you to think about your overall learning experience at school. Please answer the following questions to help us better understand how you learn in general, rather than focusing on a particular class.

	Almost never	Once in a while	Sometimes	Frequently	Almost always
6. How often do you use strategies to learn more effectively?					
7. Before you start on a challenging project, how often do you think about the best way to approach the project?					

8. How confident are you that you can choose an effective strategy to get your schoolwork done well?

Not at all confident | Slightly confident | Somewhat confident | Quite confident | Extremely confident

9. When you get stuck while learning something new, how likely are you to try a different strategy?

Not at all likely | Slightly likely | Somewhat likely | Quite likely | Extremely likely

10. Overall, how well do your learning strategies help you learn more effectively?

Not well at all | Slightly well | Somewhat well | Quite well | Extremely well

Feelings About Being at School

In this section, we would like to understand how you feel about your school overall.

11. How connected do you feel to the adults at your school?

Not at all connected | Slightly connected | Somewhat connected | Quite connected | Extremely connected

12. How well do people at your school understand you as a person?

Do not understand at all | Understand a little | Understand somewhat | Understand quite a bit | Completely understand

Proof PDF Form

13. How much do you matter to others at this school?

Do not matter at all	Matter a little bit	Matter somewhat	Matter quite a bit	Matter a tremendous amount
◯	◯	◯	◯	◯

14. How much respect do students in your school show you?

No respect at all	A little bit of respect	Some respect	Quite a bit of respect	A tremendous amount of respect
◯	◯	◯	◯	◯

15. Overall, how much do you feel like you belong at your school?

Do not belong at all	Belong a little bit	Belong somewhat	Belong quite a bit	Completely belong
◯	◯	◯	◯	◯

School Safety

In this section, tell us about how safe you feel at school.

	Almost never	Once in a while	Sometimes	Frequently	Almost always
16. How often do you worry about violence at your school?	◯	◯	◯	◯	◯
17. How often are people disrespectful to others at your school?	◯	◯	◯	◯	◯

18. At your school, how unfairly do the adults treat the students?

Not at all unfairly	Slightly unfairly	Somehwat unfairly	Quite unfairly	Extremely unfairly
◯	◯	◯	◯	◯

19. How often do student get into physical fights at your school?

Almost never	Once in a while	Sometimes	Frequently	Almost always
◯	◯	◯	◯	◯

20. Overall, how unsafe do you feel at your school?

Not at all unsafe	Slightly unsafe	Somewhat unsafe	Quite unsafe	Extremely unsafe
◯	◯	◯	◯	◯

Teacher Student Relationships

How much do you agree with the following statements about your English class: The teacher for this class...

	Strongly disagree	Disagree	Agree	Strongly agree
21. ...helps me catch up if I am behind.	◯	◯	◯	◯
22. ...is willing to give extra help on schoolwork if I need it.	◯	◯	◯	◯
23. ...notices if I have trouble learning something.	◯	◯	◯	◯
24. ...gives me specific suggestions about how I can improve my work in this class.	◯	◯	◯	◯
25. ...explains things in a different way if I don't understand something in class.	◯	◯	◯	◯

Classroom Rigor

How much do you agree with the following statements about your teacher in your English class: The teacher for this class...

	Strongly disagree	Disagree	Agree	Strongly agree
26. ...often connects what I am learning to life outside of the classroom.	◯	◯	◯	◯
27. ...encourages students to share their ideas about things we are studying in class.	◯	◯	◯	◯
28. ...often requires me to explain my answers.	◯	◯	◯	◯
29. ...encourages us to consider different solutions or points of view.	◯	◯	◯	◯
30. ...doesn't let students give up when the work gets hard.	◯	◯	◯	◯
31. ...often connects what I am learning to my culture or background.	◯	◯	◯	◯
32. ...often connects what I am learning to my community.	◯	◯	◯	◯

College Going Culture

How much do you agree with the following: At my high school...

	Strongly disagree	Disagree	Agree	Strongly agree
33. ...teachers work hard to make sure that all students are learning.	◯	◯	◯	◯
34. ...all students are encouraged to go to college.	◯	◯	◯	◯
35. ...teachers pay attention to all students, not just the top students.	◯	◯	◯	◯
36. ...teachers work hard to make sure that students stay in school.	◯	◯	◯	◯
37. ...my friends in school will attend college after high school.	◯	◯	◯	◯
38. ...the students in my school will attend college after high school.	◯	◯	◯	◯

College Advising

Has anyone AT YOUR SCHOOL discussed the following with you:

	Did not discuss	Discussed briefly	Discussed in-depth
39. Different admissions requirements among four-year colleges?	◯	◯	◯
40. How to decide which college to attend?	◯	◯	◯
41. Your likelihood of being accepted at different types of schools?	◯	◯	◯
42. What ACT/SAT scores you need to get into the colleges you want to attend?	◯	◯	◯
43. Opportunities to attend out-of-state schools?	◯	◯	◯
44. How to pay for college?	◯	◯	◯

Classroom Engagement

How much do you agree with the following statements about your English class?

	Strongly disagree	Disagree	Agree	Strongly agree
45. I usually look forward to this class.	◯	◯	◯	◯
46. I work hard to do my best in this class.	◯	◯	◯	◯
47. Sometimes I get so interested in my work I don't want to stop.	◯	◯	◯	◯
48. I often count the minutes until class ends.	◯	◯	◯	◯
49. It is clear what I need to do to get a good grade.	◯	◯	◯	◯
50. The work we do in class is good preparation for the tests.	◯	◯	◯	◯
51. I learn a lot from feedback on my work.	◯	◯	◯	◯
52. The homework assignments help me learn the course material.	◯	◯	◯	◯
53. Problems outside of class kept me from doing my best.	◯	◯	◯	◯

School Engagement Questions

54. What kinds of grades do you usually get?

◯ Mostly As ◯ Mostly As and Bs ◯ Mostly Bs ◯ Mostly Bs and Cs ◯ Mostly Cs ◯ Mostly Cs and Ds ◯ Mostly Ds ◯ Mostly Ds and Fs ◯ Mostly Fs

	Never	Once a week	Twice a week	Three days per week	Four days per week	Five days per week
55. ...are you alone after school without adult supervision?	◯	◯	◯	◯	◯	◯
56. ...do you participate in academic activities (e.g., tutoring, homework help, etc.) after school?	◯	◯	◯	◯	◯	◯
57. ...do you participate in enrichment activities (clubs, sports/fitness, music, etc.) after school?	◯	◯	◯	◯	◯	◯
58. ...do you participate in STEAM (science, technology, engineering, the arts, or math) activities after school?	◯	◯	◯	◯	◯	◯

College Aspirations

In this section, tell us about your educational goals.

59. What is your plan once you finish high school?

◯ Continuing my education ◯ Work full time ◯ Join the military ◯ Other plans

60. I would like to attend a:

◯ 4 year college ◯ 2 year community college ◯ Vocational/technical schools ◯ Don't know

61. What is the highest level of education you plan to complete?

◯ Not planning to complete high school ◯ High school ◯ Career/technical school ◯ 2-year community college or junior college ◯ 4-year college or university ◯ Graduate or professional school ◯ Undecided ◯ Other

Proof PDF Form

IB Specific Questions

62. Which of the following best describes you?

I am taking at least one IB class but do not plan to take any IB exams.	I am taking at least one IB class and plan to take at least one IB exam.	I am planning to complete the full IB Diploma Programme.	I am planning to complete the IB Career-related Programme.	I am not enrolled in any IB courses.
◯	◯	◯	◯	◯

Did you participate in any of the following in 9th or 10th grade? If the program was not offered at your high school, please select "Not available at my high school.

	No	Yes	Not available at my high school
63. IB Middle Years Programme	◯	◯	◯
64. Honors/advanced courses or pre-IB track in 9th and 10th grades	◯	◯	◯
65. AVID	◯	◯	◯
66. Upward Bound	◯	◯	◯
67. UC Merced Talent Search	◯	◯	◯

	Almost never	Once in a while	Sometimes	Frequently	Almost always
68. Think about how students are recruited to participate in IB at your school. To what extent were ALL students at your middle school encouraged to participate in the IB Diploma Programme?	◯	◯	◯	◯	◯
69. Think about how students are recruited to participate in IB at your school. To what extent are ALL students at your high school encouraged to participate in the full IB Diploma Programme?	◯	◯	◯	◯	◯

To what extent do you think the following factors discourage students from participating in the IB Diploma Programme? Choose "Not applicable" if the factor does not apply at your school.

	Almost never	Once in a while	Sometimes	Frequently	Almost always	Not applicable
70. Difficulty of the application process.	◯	◯	◯	◯	◯	◯
71. Entrance exam.	◯	◯	◯	◯	◯	◯
72. Obtaining a teacher recommendation.	◯	◯	◯	◯	◯	◯
73. Teacher approval to register for an IB class.	◯	◯	◯	◯	◯	◯
74. Cost to take IB assessments.	◯	◯	◯	◯	◯	◯
75. Difficulty of the coursework.	◯	◯	◯	◯	◯	◯
76. Time commitment required to participate in IB.	◯	◯	◯	◯	◯	◯

Background Questions

Demographic questions about students

77. What is your gender?

◯ Female ◯ Male

0

78. What is your grade level?

○ 9 ○ 10 ○ 11 ○ 12

79. What is your race or ethnicity?

○ American Indian or Alaska Native ○ Asian ○ Black or African American ○ Hispanic or Latino ○ Native Hawaiian or Other Pacific Islander ○ White ○ Two or More Races/Ethnicities ○ Other

80. If you selected "Two or More Races/Ethnicities" or "Other," and would like to provide more of a description, please use the space below.

_____

_____

81. Please indicate the primary language you speak at home. (Please indicate only one.)

○ Chinese ○ English ○ French ○ German ○ Italian ○ Korean

○ Russian ○ Spanish ○ Tagalog ○ Vietnamese ○ Other ○ Multiple languages

82. If you selected "Other" or "Multiple languages," please describe what language(s) you speak currently in the space below.

_____

_____

83. Please select the highest level of education completed by your mother. If you are not sure, please take your best guess.

○ Elementary school ○ Middle school ○ Some high school ○ High school degree ○ Some college ○ College degree ○ Some graduate school ○ Graduate degree

84. What school do you attend?

○ Fresno High School ○ Modesto High School ○ Norte Vista High School

Proof PDF Form

Appendix C: Student Interview Protocols

Group 1 (High school/College Year 1 students)

Interview 1

2. How did you hear about this school? What it like going to school here? How do you think students at another school in your district (name rival school) would describe your school?
3. How are students treated at this school? By teachers? Counselors? Can you give me an example?
a. What are your teachers like?
b. What are your counselors like?
4. Generally speaking, why do you think people go to college?
5. Is everyone expected to go to college here? How do you know this?
6. Do your teachers discuss other cultures? Your own cultural background? Other countries' traditions? Languages? Can you give me an example?
7. Tell me about your friends at this school.
a. Do your friends have the same goals as you?
b. Do you have friends that attend other schools? Why or why not? Do they have the same goals as you?
8. Do you feel like you belong to this school community? Are you comfortable as a student here? Can you give me an example?
9. What factors have contributed to your success so far?
10. What are your goals for after high school?
a. Who has helped you define your goals? Do you have any mentors?
b. How do you plan to reach your goals? Do you foresee any obstacles?
c. How sure are you that you will go to college?
11. (If student answers go to college) What colleges do you hope to apply for next fall?
d. How did you come up with the list?
e. What do you know about these schools? Why did you pick these schools?
f. Do you know anyone who's gone to any of these schools?
g. Will anybody help you apply [to college]?
12. Have any of your family members gone to college?
13. How do you talk with your **family** about college? What kinds of stories do you hear?
14. Have you met with a **counselor** to talk about college? What sort of things do you discuss at these meetings? Who initiates them? Did these meetings result in any surprises about college requirements, etc.? What part of the meeting(s) helped you the most? Did counselors suggest any particular schools that you should look into applying to and attending? If so, is that where the students want to go?
15. Do you talk about college issues in your classes? What class? Is this helpful?

16. Have you visited any colleges? What were your impressions of the campus? What types of things did you do there?

17. Do you think it will be difficult to gain admission to your top college? Why -- what do you think are the requirements to get into [the public university]? [Probe: How did you learn about the requirements? What matters more in terms of being able to get into the two universities grades, SAT, etc.? Are there ways of "getting around" any of these requirements? Which ones? How? (be as specific as possible)]
18. From what you know, does a community college usually offer the same bachelor's degree that a university offers?

Interview #2

1. Have you thought about how you will pay for college? Will your family help you or do you think your family may have financial difficulties paying for the college you would like to attend?
2. To the best of your knowledge, are the resident tuition and fees about the same for four-year state colleges as they are for two-year community college?
3. Do you feel like you understand what will be expected of you in college, academically, and how you should prepare for it?
4. Do you study/do homework with your friends from school? Friends from other schools? Family members?
5. What careers are you thinking about? What are the steps you need to take to get to those careers?
6. Is there anything that is difficult about being in the IB programme?
7. Are there any other ways that the IB programme has helped you?

Interview 3 Questions

1. What kind of activities do you participate in as a college student? Do you work? Volunteer? Did you attend a study abroad program?
2. How was your adjustment to college? Did you feel you adjusted just fine, did it take a term or two to adjust, or do you feel like you might still be adjusting?
3. Are you on track to graduate? What helped you balance work (and/or other responsibilities) and academic goals through college?
4. When you are feeling overwhelmed or confused, how do you reach out for help?
5. What makes you unique or distinctive/different/make you stand out from your peers?
6. Did you encounter any barriers from the point you registered through the fall drop-out date? Describe these barriers.
7. Is there anything about the IB programme that you feel significantly impacted your college experience?
8. What are your plans for post grad? (grad school, job, training program etc.)

Group 2 (Post-secondary schooling/College students)

Interview 1 Questions

1. Tell me about your family background. (Follow up questions: Where does/did your family live? What language was/were spoken in the home? What do your parents do?)

2. Tell me about your friends in high school. (Follow up questions: Did they attend the same classes as you? In the same programs, clubs, activities?)
3. What was your experience in the IB programme at your high school? (Follow up: How the IB programme influence your high school experience? How did you relate to teachers and coordinators in the IB programme at your school?)
4. How did you gain entry into the IB programme at your high school? Who was included in the programme? What kinds of students did not participate?
5. Tell me a little about how you spent your time outside of the school day (after school and weekends) during high school? Did this influence your schooling experience? How? (Probe for working schedules, study groups, extracurricular activities)
6. How did you prepare for the college application process in high school? Middle school? (probe for programs such as AVID, parental or peer influence)
7. Did you feel well prepared for college? Academically? Socially?
8. When do you expect to graduate college?
9. What do you hope to do after you graduate college? Do you feel like there any obstacles to your plans?
10. What do your parents think about your college choice? Post college plans?

Interview 2 Questions

1. Since we last spoke, you were enrolled in _____ college/university. Tell me about your experience since then. How have things changed?
   a. How do you feel engaged academically? socially?
   b. When will you complete college?
   c. What are your plans for after college?
2. How do you spend your time outside of the college classroom?
3. We are interested in understanding how first-generation students *persist in college*. How might have you tackled a challenge or issues in college recently? What were the resources (people) you used to help you? (probe for family, friends, school resources, community programs)
   a. What challenges, if any have you faced during your time in college? Where there any mentors, faculty, staff that supported you through these challenges?
   b. What keeps you motivated?
4. Has your college experience been what you expected? Did anything surprise you? Was there anything you wish you would have known before starting college?
5. Family Dynamics: Do you stay connected with family? What role does your family play in your college experience/success?
6. Do you stay connected with any of your former High School IBO colleagues/peers, teachers, staff? What is the relationship? How do you all continue to support each other- if you do?
7. How do you define success in college?

Interview 3 Questions

1. What kind of activities do you participate in as a college student? Do you work? Volunteer? Did you attend a study abroad program?
2. How was your adjustment to college? Did you feel you adjusted just fine, did it take a term or two to adjust, or do you feel like you might still be adjusting?
3. Are you on track to graduate? What helped you balance work (and/or other responsibilities) and academic goals through college?
4. When you are feeling overwhelmed or confused, how do you reach out for help?
5. What makes you unique or distinctive/different/make you stand out from your peers?
6. Did you encounter any barriers from the point you registered through the fall drop-out date? Describe these barriers.
7. Is there anything about the IB programme that you feel significantly impacted your college experience?
8. What are your plans for post grad? (grad school, job, training program etc.)

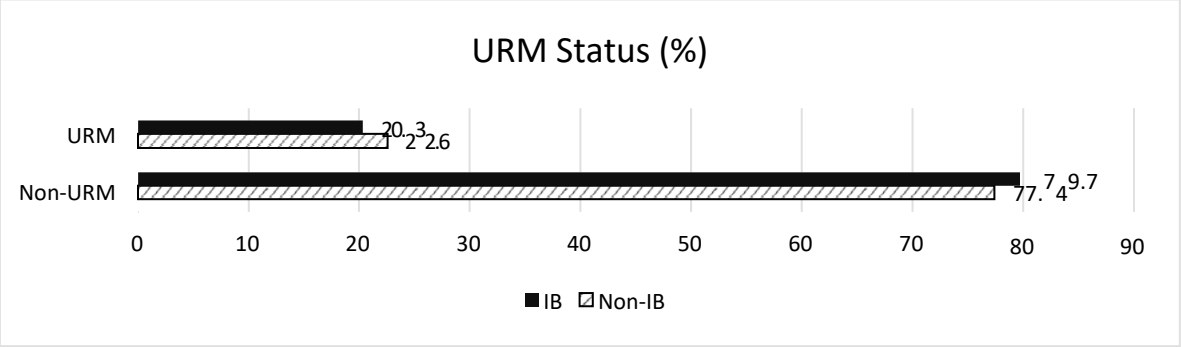
Appendix D: Analyses of IB Programme Effect

Descriptive statistics

Underrepresented minority status

As for underrepresented minority (URM) status, American Indian, African American, Chicano, or Latino students are grouped together in the UC data system. Non-URM students include white and Asian students. With respect to URM status, approximately one-in-five students in both IB and non-IB groups were underrepresented minority students. Of non-IB students, however, 23% of students identified themselves as URM, and 20% of IB students reported that they were URM.

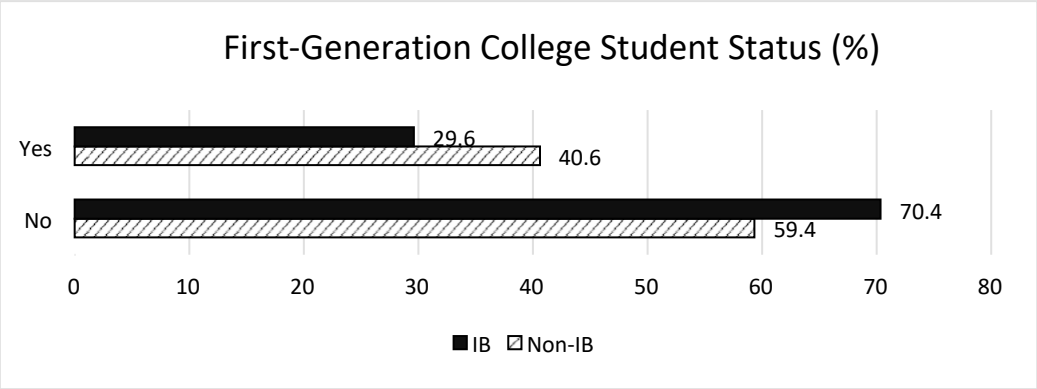
Figure 1: Comparison of IB students to non-IB students by URM status



First-generation college students

Regarding whether a student was a first-generation college student, the majority of students in our data were not first-time college students. 70% of IB students and nearly 60% of non-IB students reported that they were not first generation in terms of attending college. As for first-time college student status, more non-IB students (41%) were first-generation college students in comparison to their IB counterparts (30%).

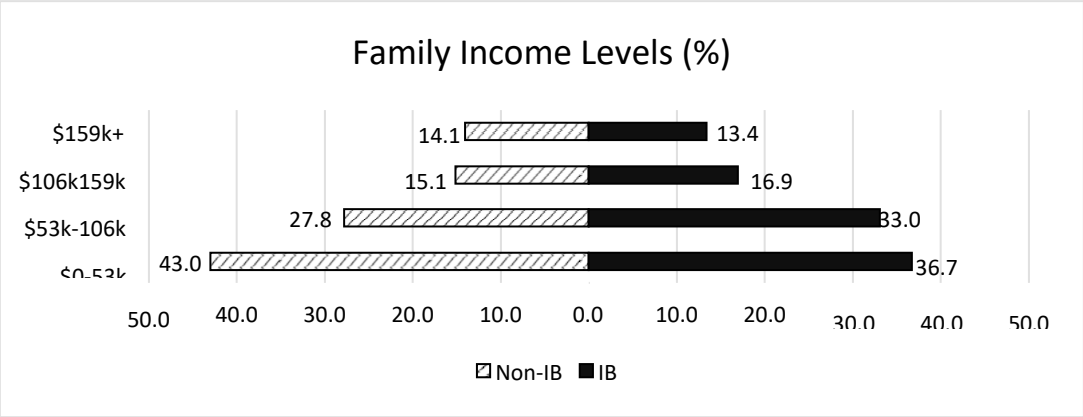
Figure 2: Comparison of IB students to non-IB students by first-generation college student status



Family income levels

We also compared IB students to non-IB students in terms of family income levels. Regarding income levels, the University of California uses somewhat arbitrary categories that include only four ranges: (1) $0-$53,000, (2) $53,001-106,000, (3) $106,000-159,000, and (4) $159,000 or higher. Moreover, the data do not report how many individuals reside in a household. We were cautious about simply exploring family income levels based on the given categories because some URM students are from extended families with more family members than nuclear families. In such case, per-capita earning for extended families should be lower than one for nuclear families even though a student's family income level is identical. As for results, more than one-in-three IB students came from the lowest income range level. Slightly more than 40% of non-IB students were from the same income-level family. As for the next income-level range ($53,000-106,000), 33% of IB students and 28% of non-IB students came from this middle-level SES background. Additionally, 17% and 13% of IB students came from upper-level SES and the highest SES level ranges, respectively.

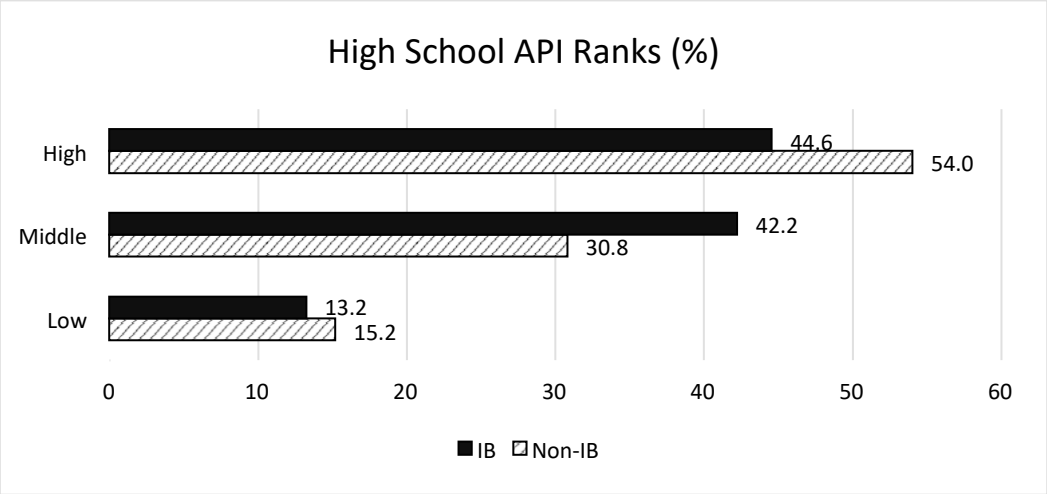
Figure 3: Comparison of IB students to non-IB students by family income levels



High school API ranks

We then examined students' high school rankings in terms of Academic Performance Index[4] (API). The large majority of both IB and non-IB students graduated from high-performing high schools. Specifically, 45% of IB students and 54% of non-IB students attended high schools that scored high on API results. For IB students, a similar percentage of students (42%) went to high schools whose API ranks were in the middle. The data also had a small but non-negligible percentage of students who attended low-performing high schools. 13% of IB students and 15% of non-IB students came from such schools.

Figure 4: Comparison of IB students to non-IB students by high school API ranks



[4] Academic Performance Index (API) measures the academic performance and growth of schools on a variety of academic measures.

Academic Performance in High School

We explored a student's academic performance at high schools by one's IB status. With respect to test (e.g., SAT and ACT) results, there was a significant difference in the scores for IB students (M=1800.6, SD=234.2) and non-IB students (M=1699,4, SD=262.6); $t(33447)= 11.59$, $p<0.001$. The IB group, in general, outperformed the non-IB group, and the difference in the test scores was dramatically different. As for high school GPAs, we also found a similar result. There was a statistically significant difference in the high school GPAs for IB students (M=3.85, SD=.34) and non-IB students (M=3.78, SD=.38); $t(99056)= 10.40$, $p<0.001$. IB students, on average, performed better than their non-IB counterparts in terms of high school GPA results.

Number of advanced courses taken

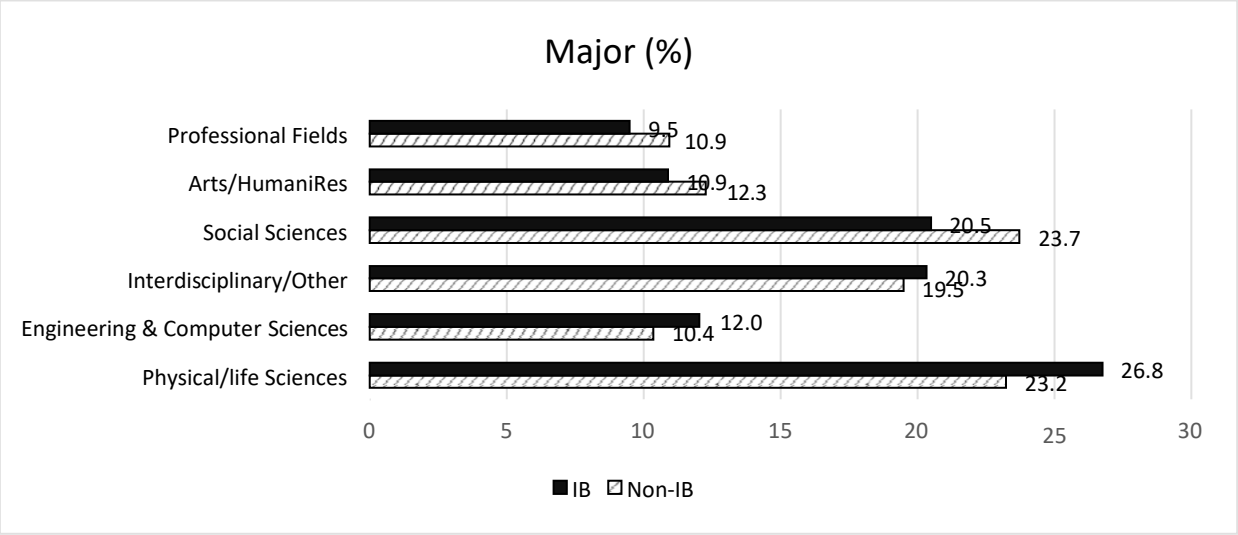
In terms of the number of advanced courses, we explored the number of AP, IB and A-G courses that students reported. With regard to the number of IB courses, there was a significant difference for IB students (M=13.7, SD=5.0) and non-IB students (M=.10, SD=.6); $t(99430) = 668.87$, $p<0.001$. Due to our binary IB group setting, the difference in the number of IB course taken was more substantially significant compared to the number of AP and A-G courses. By and large, non-IB students – defined as students who took less than 8 IB courses – virtually took no IB courses, while IB students took 14 IB courses, on average. Regarding the number of AP courses taken, we also found a significant difference for IB students (M=5.2, SD=4.9) and non-IB students (M=8.9, SD=5.2); $t(99367) = 36.00$, $p<0.001$. Unlike the aforementioned result, IB students took a fair number of AP courses along with IB courses. Finally, there was a significant

difference in the number of A-G courses taken for IB students (M=51.8, SD=9.5) and non-IB students (M=47.2, SD=7.9); t(99440) = 29.24, p<0.001. In general, IB students took roughly five more A-G course compare to their non-IB peers.

College Majors

The data for our study encompasses students from a wide variety of major fields, including Arts/Humanities, Social Sciences, Engineering and Computer Sciences, Physical and Life Sciences, Professional fields, and Interdisciplinary Studies. Nearly one-quarter of students in the data majored in Physical/Life Sciences followed by Social Sciences majors. The proportion of IB students was higher in the field of Sciences in comparison to Social Sciences and Humanities.

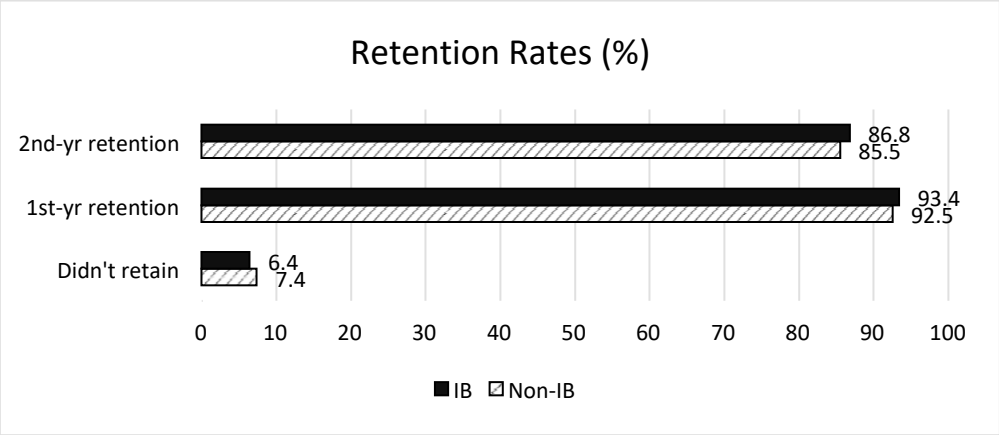
Figure 5: Comparison of IB students to non-IB students by student majors



Retention rates

The large majority of students successfully completed their first year (93.4%). As for second-year retention rates, the proportion of students who finished their second year slightly declined to roughly 86%. IB students were modestly better than non-IB students in terms of college retention rates.

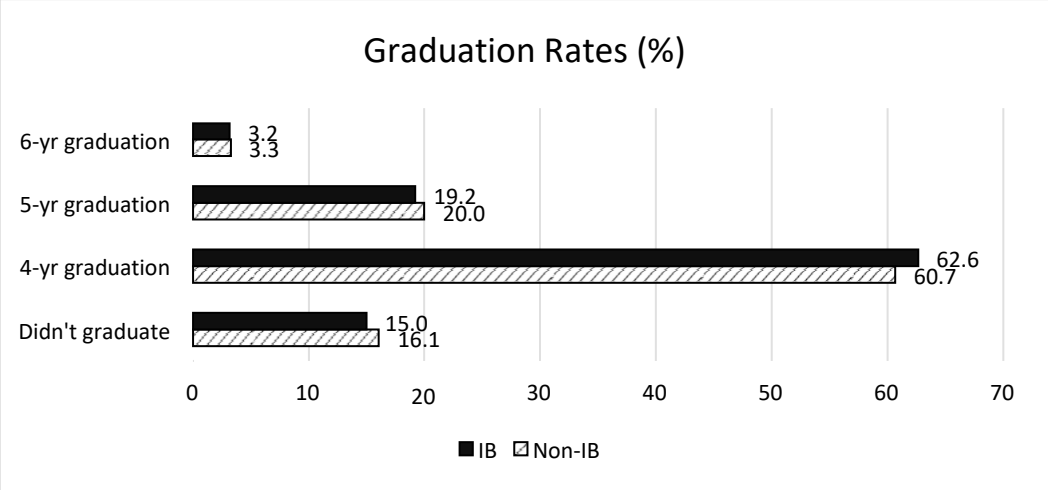
Figure 6: Comparison of IB students to non-IB students by college retention rates



Graduation rates

When it comes to graduation rates, more than 60% of students graduated from the University of California in four years, and one-in-five students obtained their college diplomas in five years. It took six years for a small percentage of students (3%) to complete their college degrees. Slightly less than one-in-six students did not graduate from a college within six years. They might have left a college for personal reasons, or it might have taken more than seven years for them to graduate. In this study, however, we did not follow those who did not finish their college degrees. As for the percentage of students who graduated in four years, IB students (63%) showed better records than non-IB students (61%). Although the difference is small, it was apparent that IB students built up a positive academic trajectory compare to their non-IB counterparts.

Figure 7: Comparison of IB students to non-IB students by graduation rates



Inferential statistics

This study uses data in which randomization is absent. The lack of random assignment of units to condition can cause observed bias that threats the validity of the study (Shadish, Cook, & Campbell, 2002). To address the absence of random control, advanced statistical methods, such as propensity scores, structural equation modeling, and instrumental variables, can be considered (Guo & Fraser, 2010). Of various methods, we found the matching method effective for this study because we could examine the treatment effect while controlling for propensity scores created by using various sets of covariates in our data.

Specifically, we explored the effects of IB programs on students' academic performance in two different ways: (1) propensity-score matching (PSM) and (2) nearest neighbor matching (NNM). First, we estimated the average IB effects by propensity-score matching. PSM estimators calculate missing potential outcomes for each student by using an average of the outcome variables of students in similar situations who participated in the IB program. In PSM analysis, similarity is determined by how near observations are in terms of estimated treatment probabilities, known as propensity scores. Controlling for propensity score based on observed covariates, we examined average treatment effect (ATE) of the IB program on students' academic achievement. That is,

$$\tau = E[E(Y_1, \mid e(x_i), W_i = 1) - E(Y_0, \mid e(x_i), W_i = 0)] = E[Y_1 - Y_0 \mid e(x_i)]$$

where $e(x_i) = pr(W_i = 1 | X_i = x_i)$

x_i = observed covariates

Second, we analyzed the average effects of the IB program by nearest-neighbor matching. Like PSM, NNM estimators imputed counterfactual outcomes for each observation by using an average of the outcome variables of similar students who received the treatment effect. Similarity between observations is defined by a weighted function of the difference between the observed outcomes and the imputed outcomes for each observation.

$$C(P_i) = \min_j ||P_j - P_j||, j \in I_0$$

where P_i and P_j are the propensity scores for treated and control participants, respectively.

I_1 is the set of treated participants; I_0 is the set of control participants. $C(P_i)$ includes a control participant j (as a match for treated participant i.

In NNM analysis, matching one on more than one continuous variables can cause a large-sample bias (Abadie & Imbens, 2006; 2012); thus, we made an adjustment of the relevant covariates. In addition, for categorical variables, we also made an exact match on specified

variables. Of scaling matrix choices for NNM, we used the Mahalanobis method. Using PMS and NNM, we conducted a series of analyses to investigate the effect of the IB on students' retention rates, graduation rates, and graduation GPAs. We then ran the same analyses by focusing on underrepresented minority students only. As for statistical software package, we used Stata
14.0 for conducting analyses in this study.

Limitations

Although we confirmed the positive impact of the IB program on students through a series of analyses, we also recognize the limitations of the study, especially in terms of using propensity score matching. According to Rubin (1997), propensity scores are not able to control for predictors that are not observed in the data, and the method is more effective in data with larger samples. Finally, propensity scores do not deal with a covariate that is associated with treatment effect (e.g., IB program in this study), but not linked with outcome (e.g., graduation GPAs in this study). Rubin (1997) suggest that propensity scores handle a covariate in a better way when the covariate with the same relationship with the treatment is strongly related to the outcome variable.

In addition, we noticed that PSM and NNM results differed in the magnitudes of the effect and statistical significant levels for the same outcome variables. In order to review the differences in the results between the two methods, we performed a series of postmatching analyses based on stratification of the propensity scores. Most results did not show the difference between the IB group and non-IB group in the stratification analyses. However, we did not address the details of the stratification analysis results because we were more interested in the overall effect of the IB program on UC students. Furthermore, the small sample size for some subclasses made it challenging to confirm the results. In general, different results across the analyses imply that we need to be cautious about interpreting the effect of the IB program although the program did show positive academic impact on students' academic performance.

References for Appendix D

Abadie, A., & Imbens, G. W. (2006). Large sample properties of matching estimators for average treatment effects. *econometrica*, *74*(1), 235-267.

Abadie, A., & Imbens, G. W. (2012). Bias-corrected matching estimators for average treatment effects. *Journal of Business & Economic Statistics*.

Guo, S., & Fraser, M. W. (2010). Propensity score analysis: Statistical methods and applications. London: Sage.

Rubin, D. B. (1997). Estimating causal effects from large data sets using propensity scores. *Annals of internal medicine*, *127*, 757-763.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Belmont, CA: Wadsworth Cengage Learnin

Appendix E: Survey data analyses

Table E-1. Summary of results of regression analyses using Year 1 and Year 2 survey data

Outcomes variable	Year 1	Year 2
	Reference group: non-IB students	
Learning Composite variable that measured student learning experiences at school, including how often student use strategies to learn more effectively, how often they thinks about the best way to approach a project, confidence about choosing an effective strategy to get their schoolwork done well, how well learning strategies helps them learn more effectively.	*Significant positive difference full DP (β= .21, p<.005)*	*Significant positive difference full DP (β= .24, p<.05)*
Classroom Rigor Seeks to understand how much students feel that a specific teacher holds them to high expectations around effort, understanding, persistence and performance in class.	*Significant positive difference full DP (β= .36, p<.001) and partial DP students (β=.29, p<.001).*	*Significant positive difference full DP (β= .39, p<.001)*

Classroom Engagement

This scale is a combination of social emotional factors and teaching factors. The work we do in class is good preparation for the tests, I learn a lot from feedback on my work, and the homework assignments help me learn the course material.

Significant positive difference for full DP (β= .15, p<.05) and for partial DP (β= .16, p<.05).

What else influences engagement? African American respondents were less likely to get engaged in classroom, and the magnitude was sizable and significant (*β*= –.38, *p*<.01). In contrast, Asian respondents were more likely to report higher levels of classroom engagement (*β*= .24, *p*<.05) than their Latino peers were.

GPA (*(β*= .150, *p*<.001) students with higher GPAs were more likely to have better classroom engagement.

Male students were less likely to get engaged in classroom than their female counterparts (*(β*= .-.14*, p<.01).*

Significant positive difference full DP (β= .255, p<.05)

What else influences engagement? GPA *(β*= .20, *p<.001)* students with higher GPAs were more likely to have better classroom engagement.

School Engagement The extent to which students got involved in after-school activities in order to capture students' participation in school activities such as sports, clubs, and leadership.	*Significant positive difference full DP (β= .21, p<.001) and partial DP (β= .16, p<.01).* *What else influences involvement in activities?* Gender, GPA *(β= .22, p<.001)*, and maternal education variables *(β= .075, p<.001)*. In general, male students were more likely to participate in school activities than their female peers *(β= .11, p<.001)*.	*Significant positive difference full DP* (*β*= .18, *p<.05)* *What else influences involvement in activities?* GPA *(β*= .23, *p<.001*) and maternal education *(β*= .085 *p<.001)* variables.

Teacher-Student Relationships

The extent to which a respondent felt supported through his/her relationship with a teacher

No noticeable differences across groups by IB status.

What else influences relationships?
Asian students were more likely to experience quality teacher-student relationships than their Latino counterparts were *(β= .26, p<.05)*.
Male students were less likely to be satisfied than their female peers were *(β= – .11, p<.05)*.
GPA was positively and statistically significantly associated with predicting a student's relationship with his/her teacher (*(β= .130, p<.001)*.

Students at Lincoln *(β= .30, p<.001)*.and Dominguez *(β= .23, p<.001)*. were more likely to experience positive teacher-student relationships than their counterparts at Valley High after adjusting for the other predictors

Significant positive difference full DP (*(β= .34, p<.01)*

What else influences relationships?

GPA was positively and statistically significantly associated with predicting a student's relationship with his/her teacher *(β= .115, p<.001)*.

College-Going Culture (1) teachers work hard to make sure all students are learning, (2) all students are encouraged to go to college, (3) teachers pay attention to all students, not just the top students, (4) teachers work hard to make sure that students stay in school, (5) a respondent's friends in school will attend college after high school, (6) the students in a respondent's school will attend college after high school.	*Significant positive difference for full DP (β=.33, p<.001) and partial DP students (β=.29, p<.001).*	*Significant positive difference for full DP (β=.25, p<.05) and partial DP students. (β=.24, p<.05).*
College Advising Extent to which a student discussed topics regarding different admissions requirements among four-year colleges, how to decide which college to attend, a student's likelihood of being accepted at different types of schools, specific information about ACT/SAT scores a student needs to get into the colleges h/she wants to attend, opportunities to attend out-of-state schools, and how to pay for college.	*Full DP students (β=.25, p<.005) and partial DP students (β=.275, p<.005) were more likely to have college-advising support* What else influences advising? GPA was positively and significantly associated *(β= .08, p<.01)* Dominguez in general had more positive college-advising support than their peers at Valley High *(β= .21, p<.005).*	*Full DP students (β=.32, p<.01) and partial DP students (β=.21, p<.05) were more likely to have higher college-advising support* What else influences advising? GPA variable was positively and significantly associated *(β=.09, p<.05)* The higher mothers' educational attainment is, the better college-advising experiences students in this study reported *(β= .08, p<.05).*

College aspiration Measured by a survey question regarding the highest level of education that a respondent planned to complete.	*Full DP students (β=.65, p<.001) and partial DP students (β=.47, p<.005) were more likely to have stronger plans for college-attainment.*	*Full DP students (β=.53, p<.01) and partial DP students (β=.42, p<.01) were more likely to have stronger plans for college-attainment.*

Table E-2. Descriptive statistics results for Year 1 survey sample

Variables	All students N=1063	Non–IB students N=492	Full DP students N=235	Partial DP students N=220	Other students N=116
Covariates					
Hispanic/Latino	.693	.756	.619	.688	.624
White	.085	.080	.094	.053	.147
Black	.029	.018	.036	.039	.037
Asian	.068	.055	.108	.053	.064
American Indian	.010	.005	.009	.019	.009
Other/Multiracial	.116	.087	.135	.149	.119
Valley HS	.441	.691	.336	.082	.276
Lincoln HS	.294	.041	.413	.573	.595
Dominguez HS	.265	.268	.251	.346	.129
Home language – English or not	.437	.374	.485	.432	.612
Gender	.490	.480	.431	.507	.611
Self–reported GPA	6.753	6.476	7.493	6.684	6.433
Maternal education	3.906	3.674	4.445	3.830	3.860
Outcome variables					
Learning/Classroom–related topics					
Learning (Composite)	3.302	3.215	3.551	3.355	3.068
Classroom rigor (Composite)	2.978	2.864	3.221	3.055	2.819
Classroom engagement (Composite)	2.923	2.864	3.066	2.991	2.747
School engagement (Composite)	3.144	2.901	3.540	3.261	3.061
Teacher–student relationships (Composite)	2.992	2.922	3.173	3.045	2.812
College–related topics					
College–going culture (Composite)	2.919	2.833	3.057	2.991	2.830
College advising (Composite)	2.080	1.981	2.190	2.188	2.068
College aspiration	4.856	4.641	5.324	4.880	4.625

Notes: Home language variable is binary: 0 non–English, 1 English. Gender variable is binary: 0 female, 1 male. Self–reported GPA variable ranges from 1(Mostly Fs) to 9(Mostly As). Maternal education level variable ranges from 1(Elementary school) to 8(Graduate degree). Composite variables were created based on confirmatory factor analyses. [2]

2

Variables defined

IB status definition

- Non–IB students (reference): (1) Not enrolled in IB + (2) No response (missing)
- Full DP: Plan to complete IBDP only
- Partial DP: (1) Plan to complete IB career–related program + (2) am taking IB and plan to take IB exams
- Other students: Am taking IB but don't plan to take IB exams

Race (reference: Latino):

- Asian: Asians + Pacific Islanders

Language (reference: non–English spoken at home)
School (reference: Valley HS)
Gender (reference: female)

Table E-3. Regression analysis results on learning, Year 1 survey sample

Variables	β	SE	p
Reference: Non–IB group			
Full DP	.211	.072	.004
Partial DP	.112	.077	.143
Other	–.069	.090	.442
Reference: Hispanic/Latino			
White	–.074	.098	.450
Black	.200	.154	.194
Asian	.129	.104	.215
American Indian	.047	.253	.853
Other/Multiracial	–.002	.082	.979
Home language – English or not	–.064	.058	.268
Gender	.086	.050	.087
Self–reported GPA	.201	.026	.000
Maternal education	.002	.027	.946
Reference: Valley HS			
Lincoln HS	–.098	.073	.182
Dominguez HS	–.038	.066	.566

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-4. Regression analysis results on classroom rigor, Year 1 survey sample

Variables	β	SE	p
Reference: Non–IB group			
Full DP	.360	.067	.000
Partial DP	.286	.072	.000
Other	–.031	.084	.712
Reference: Hispanic/Latino			
White	.000	.092	.998
Black	–.332	.144	.021
Asian	.263	.098	.007
American Indian	.071	.237	.764
Other/Multiracial	–.020	.076	.793
Home language – English or not	.093	.054	.086
Gender	–.241	.047	.000
Self–reported GPA	.122	.024	.000
Maternal education	.020	.026	.443
Reference: Valley HS			
Lincoln HS	.001	.069	.989
Dominguez HS	–.038	.061	.531

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-5. Regression analysis results on classroom engagement, Year 1 survey sample

	Variables	β	SE	p
Reference: Non–IB group				
	Full DP	.148	.065	.023
	Partial DP	.163	.069	.018
	Other	–.154	.081	.059
Reference: Hispanic/Latino				
	White	–.078	.088	.380
	Black	–.382	.138	.006
	Asian	.244	.094	.010
	American Indian	.121	.228	.595
	Other/Multiracial	–.074	.073	.313
	Home language – English or not	.068	.052	.191
	Gender	–.139	.045	.002
	Self–reported GPA	.150	.023	.000
	Maternal education	–.024	.025	.322
Reference: Valley HS				
	Lincoln HS	.027	.066	.686
	Dominguez HS	.051	.059	.385

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-6. Regression analysis results on school engagement, Year 1 survey sample

	Variables	β	SE	p
Reference: Non–IB group				
	Full DP	.210	.048	.000
	Partial DP	.161	.051	.002
	Other	.130	.060	.031
Reference: Hispanic/Latino				
	White	.018	.065	.782
	Black	.116	.102	.256
	Asian	–.088	.069	.203
	American Indian	–.094	.168	.576
	Other/Multiracial	.013	.054	.809
	Home language – English or not	–.034	.038	.383
	Gender	.107	.033	.001
	Self–reported GPA	.222	.017	.000
	Maternal education	.075	.018	.000
Reference: Valley HS				
	Lincoln HS	–.009	.049	.854
	Dominguez HS	.086	.044	.050

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-7. Regression analysis results on teacher–student relationships, Year 1 survey sample

Variables	β	SE	p
Reference: Non–IB group			
Full DP	.076	.078	.325
Partial DP	–.001	.082	.988
Other	–.248	.097	.011
Reference: Hispanic/Latino			
White	.113	.106	.287
Black	–.172	.165	.299
Asian	.258	.112	.022
American Indian	.123	.272	.651
Other/Multiracial	.051	.088	.563
Home language – English or not	.009	.062	.880
Gender	–.111	.054	.040
Self–reported GPA	.130	.028	.000
Maternal education	.048	.029	.105
Reference: Valley HS			
Lincoln HS	.304	.079	.000
Dominguez HS	.231	.071	.001

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-8. Regression analysis results on college–going culture, Year 1 survey sample

Variables	β	SE	p
Reference: Non–IB group			
Full DP	.333	.069	.000
Partial DP	.290	.073	.000
Other	.085	.088	.330
Reference: Hispanic/Latino			
White	–.061	.094	.514
Black	–.210	.148	.157
Asian	.108	.102	.287
American Indian	–.023	.238	.923
Other/Multiracial	–.037	.078	.641
Home language – English or not	.021	.055	.708
Gender	–.026	.048	.590
Self–reported GPA	.052	.025	.040
Maternal education	–.013	.027	.632
Reference: Valley HS			
Lincoln HS	–.071	.071	.320
Dominguez HS	–.001	.064	.994

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-9. Regression analysis results on college advising, Year 1 survey sample

Variables	β	SE	p
Reference: Non–IB group			
Full DP	.248	.075	.001
Partial DP	.275	.080	.001
Other	.165	.094	.078
Reference: Hispanic/Latino			
White	–.139	.102	.171
Black	.004	.160	.982
Asian	.087	.108	.421
American Indian	.031	.262	.907
Other/Multiracial	–.098	.085	.249
Home language – English or not	–.087	.060	.145
Gender	.015	.052	.775
Self–reported GPA	.079	.027	.004
Maternal education	.001	.028	.978
Reference: Valley HS			
Lincoln HS	.087	.076	.256
Dominguez HS	.211	.068	.002

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-10. Regression analysis results on college aspiration, Year 1 survey sample

Variables	β	SE	p
Reference: Non-IB group			
Full DP	.647	.100	.000
Partial DP	.466	.108	.000
Other	.244	.129	.059
Reference: Hispanic/Latino			
White	-.123	.140	.381
Black	-.534	.212	.012
Asian	.049	.142	.728
American Indian	-.879	.347	.012
Other/Multiracial	-.214	.119	.072
Home language - English or not	.058	.081	.473
Gender	-.243	.070	.001
Self-reported GPA	.213	.038	.000
Maternal education	.008	.038	.840
Reference: Valley HS			
Lincoln HS	-.342	.103	.001
Dominguez HS	-.170	.091	.062

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-11. Descriptive statistics results for Year 2 survey sample

Variables	All students N=609	Non-IB students N=299	Full DP students N=71	Partial DP students N=157	Full and Partial DP N=228	Other students N=82
Covariates						
Hispanic/Latino	.720	.725	.750	.669	.695	.770
White	.069	.060	.074	.063	.067	.108
Black	.033	.038	.000	.049	.033	.014
Asian	.064	.068	.059	.070	.067	.041
American Indian	.009	.011	.000	.014	.010	.000
Other/Multiracial	.106	.098	.118	.134	.129	.068
Valley HS (N=240)	.692	.070	.019	.305	.035	.394
Lincoln HS (N=231)	.147	.394	.701	.598	.605	.379
Dominguez HS (N=138)	.161	.535	.280	.098	.360	.227
Home language - English or not	.465	.428	.394	.554	.504	.488
Gender	.479	.495	.437	.460	.452	.500
Self-reported GPA	6.874	6.920	7.250	6.524	6.756	7.039
Maternal education	3.720	3.470	3.768	3.980	3.914	4.039
Elementary school	.160	.130	.099	.039	.109	.124
Middle school	.134	.101	.099	.145	.100	.122
Some high school	.235	.203	.205	.197	.205	.218
High school degree	.246	.304	.205	.211	.236	.238
Some college	.112	.116	.232	.237	.195	.161
College degree	.045	.058	.093	.132	.082	.071
Some graduate school	.015	.014	.000	.013	.005	.011
Graduate degree	.052	.072	.066	.026	.068	.055
Outcome variables						
Learning/Classroom-related topics						
Learning (Composite)	3.257	3.269	3.401	3.204	3.265	3.188
Classroom rigor (Composite)	2.916	2.877	3.103	2.913	2.972	2.899
Classroom engagement (Composite)	2.904	2.886	3.041	2.912	2.951	2.841
School engagement (Composite)	3.139	3.083	3.484	3.098	3.218	3.124
Teacher-student relationships (Composite)	2.961	2.906	3.119	2.993	3.033	2.964
College-related topics						
College-going culture (Composite)	2.899	2.836	3.029	2.967	2.986	2.884
College advising (Composite)	2.152	2.099	2.307	2.168	2.211	2.177
College aspiration	3.903	3.786	4.242	3.971	4.059	3.826

Notes: Home language variable is binary: 0 non–English, 1 English. Gender variable is binary: 0 female, 1 male. Self–reported GPA variable ranges from 1(Mostly Fs) to 9(Mostly As). Maternal education level variable ranges from 1(Elementary school) to 8(Graduate degree). Composite variables were created based on confirmatory factor analyses.

Table E-12. Regression analysis results on learning, Year 2 survey sample

Variables	β	SE	p
Reference: Non-IB group			
Full DP	.237	.118	.044
Partial DP	.194	.103	.060
Other	.041	.110	.709
Reference: Hispanic/Latino			
White	-.093	.133	.485
Black	.099	.215	.644
Asian	.039	.145	.786
American Indian	-.047	.364	.897
Other/Multiracial	-.031	.112	.781
Home language - English or not	-.116	.074	.119
Gender	.066	.067	.325
Self-reported GPA	.222	.035	.000
Maternal education	.101	.035	.004
Reference: Valley HS			
Lincoln HS	-.386	.103	.000
Dominguez HS	-.082	.099	.410

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-13. Regression analysis results on classroom rigor, Year 2 survey sample

Variables	β	SE	p
Reference: Non-IB group			
Full DP	.389	.118	.001
Partial DP	.159	.103	.124
Other	.053	.110	.632
Reference: Hispanic/Latino			
White	.083	.133	.535
Black	-.046	.215	.829
Asian	-.074	.145	.612
American Indian	.241	.365	.510
Other/Multiracial	.020	.113	.861
Home language - English or not	-.052	.075	.483
Gender	-.169	.067	.012
Self-reported GPA	.096	.035	.006
Maternal education	.020	.035	.568
Reference: Valley HS			
Lincoln HS	-.139	.103	.180
Dominguez HS	-.190	.099	.057

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-14. Regression analysis results on classroom engagement, Year 2 survey sample

Variables	β	SE	p
Reference: Non-IB group			
Full DP	.255	.114	.025
Partial DP	.160	.099	.107
Other	-.033	.106	.757
Reference: Hispanic/Latino			
White	-.035	.128	.783
Black	.096	.208	.643
Asian	-.114	.140	.415
American Indian	.194	.352	.581
Other/Multiracial	-.021	.109	.846
Home language - English or not	-.016	.072	.829
Gender	-.070	.064	.278
Self-reported GPA	.202	.034	.000
Maternal education	.010	.034	.760
Reference: Valley HS			
Lincoln HS	-.146	.100	.144
Dominguez HS	-.197	.096	.040

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-15. Regression analysis results on school engagement, Year 2 survey sample

Variables	β	SE	p
Reference: Non-IB group			
Full DP	.178	.077	.022
Partial DP	.055	.068	.414
Other	-.022	.072	.764
Reference: Hispanic/Latino			
White	.047	.088	.593
Black	-.058	.141	.682
Asian	.068	.095	.476
American Indian	-.043	.240	.858
Other/Multiracial	.072	.074	.328
Home language - English or not	-.023	.049	.642
Gender	.076	.044	.083
Self-reported GPA	.227	.023	.000
Maternal education	.085	.023	.000
Reference: Valley HS			
Lincoln HS	-.107	.068	.115
Dominguez HS	.037	.065	.574

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-16. Regression analysis results on teacher–student relationships, Year 2 survey sample

Variables	β	SE	p
Reference: Non-IB group			
Full DP	.339	.130	.009
Partial DP	.114	.114	.318
Other	.013	.122	.917
Reference: Hispanic/Latino			
White	-.101	.147	.492
Black	-.252	.238	.291
Asian	-.045	.160	.778
American Indian	.099	.404	.806
Other/Multiracial	.024	.125	.849
Home language - English or not	-.024	.082	.770
Gender	-.046	.074	.538
Self-reported GPA	.115	.039	.003
Maternal education	.058	.039	.135
Reference: Valley HS			
Lincoln HS	.005	.114	.967
Dominguez HS	-.120	.110	.277

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-17. Regression analysis results on college–going culture, Year 2 survey sample

Variables	β	SE	p
Reference: Non-IB group			
Full DP	.252	.113	.027
Partial DP	.244	.099	.014
Other	.112	.106	.290
Reference: Hispanic/Latino			
White	-.017	.128	.893
Black	-.147	.207	.477
Asian	-.040	.139	.776
American Indian	-.152	.351	.665
Other/Multiracial	.098	.109	.370
Home language - English or not	-.013	.072	.854
Gender	.052	.064	.416
Self-reported GPA	.088	.034	.009
Maternal education	.010	.034	.771
Reference: Valley HS			
Lincoln HS	-.108	.099	.276
Dominguez HS	.083	.096	.385

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-18. Regression analysis results on college advising, Year 2 survey sample

Variables	β	SE	p
Reference: Non-IB group			
Full DP	.320	.121	.009
Partial DP	.214	.106	.045
Other	.222	.114	.051
Reference: Hispanic/Latino			
White	-.308	.137	.025
Black	.465	.222	.037
Asian	-.136	.150	.363
American Indian	.265	.376	.482
Other/Multiracial	-.011	.116	.922
Home language - English or not	-.104	.077	.178
Gender	.095	.069	.170
Self-reported GPA	.087	.036	.016
Maternal education	.084	.036	.021
Reference: Valley HS			
Lincoln HS	-.203	.107	.057
Dominguez HS	.051	.103	.621

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.

Table E-19. Regression analysis results on college aspiration, Year 2 survey sample

Variables	β	SE	p
Reference: Non-IB group			
Full DP	.526	.169	.002
Partial DP	.424	.151	.005
Other	.130	.161	.421
Reference: Hispanic/Latino			
White	-.124	.210	.556
Black	.394	.406	.333
Asian	-.154	.207	.456
American Indian	-.576	.567	.310
Other/Multiracial	-.074	.161	.647
Home language - English or not	.010	.109	.925
Gender	-.105	.098	.285
Self-reported GPA	.194	.055	.000
Maternal education	.060	.052	.248
Reference: Valley HS			
Lincoln HS	-.376	.153	.014
Dominguez HS	.214	.147	.145

Note: Standardized coefficients are reported to compare the relative strength of the multiple predictors within the model.