Ohio's College Credit Plus Program: Participants' First-Year College Performance

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This exploratory study assessed the relationship between participation in Ohio's College Credit Plus (CCP) program and subsequent first-year GPA following college or university matriculation. Positive correlations were found between first-year cumulative GPA and all three dimensions of the CCP program assessed: credit hours completed, number of general education courses taken, and number of career pathway courses taken. Regression analysis found general education courses accounted for more variance in first-year GPA than career path courses, although the Fischer's Z-test for an interaction effect was not significant. Interpretation of results emphasizes the need for comparative and longitudinal follow-up studies to establish causality.

Keywords: advanced placement courses, college credits, Ohio College Credit Plus, first-year college performance, GPA, high school students, higher education, general education, career education

INTRODUCTION

The primary format of k-12 education has not been fundamentally changed since the industrial revolution. Robinson (2011) noted that schools, like the industrial revolution "emphasize linearity, conformity and standardization. One of the reasons they are not working now is that real life is organic, adaptable and diverse" (pg. 8). The needs of students today are changing as they prepare to move into a new digital age and prepare for a different type of workforce beyond their secondary education. The need and pressure for completing a post-secondary degree are growing and must be addressed to better bridge the gap between secondary and post-secondary institutions.

The issue of better preparing students for transitioning from high school to an institute of higher education (IHE) has been plaguing American schools for decades. Hebert (2001) indicates that efforts to address this issue can be traced back as early as 1971. Many attempts to improve college readiness have been developed over the years at the national level (Luna, Rush, Gramer, and Stewart, 2014). One prevailing strategy developed to help better prepare students to be successful in college upon graduating high school is to offer an opportunity for students to earn college credits while still in secondary education. This option has taken many forms, under multiple names including Post-Secondary Enrollment Option (PSEO), Dual Enrollment (DE), Joint Enrollment, and Concurrent Enrollment, all of which can be applied to courses where students are earning college credits while in high school. In recent years, the state of Ohio has

implemented a new program that consolidates many of these formats to provide a more accessible opportunity for students to accumulate accelerated college credit.

College Credit Plus

College Credit Plus (CCP) is a program which was instituted in the state of Ohio to fulfill the requirements of Ohio Revised Code (ORC) section 3365.15 and went into effect in the 2015-2016 school year (CCP 2018 Report). According to recommendations for the program by Chancellor of the Ohio Department of Higher Education, John Carey (2014), the CCP program is defined as a program that, will govern those arrangements where a student is engaged in nonsectarian, non-remedial educational coursework while in high school that automatically results in transcripted high school and college credit at the successful conclusion of that coursework…[and] will be the primary mechanism to pay for earned, transcripted college credit while in high school…" (pg. 9). The recommendations also distinguish Advanced Placement (AP) and International Baccalaureate (IB) programs that are not recommended to be counted as CCP course options.

The CCP initiative has replaced all other Dual Enrollment options in Ohio public schools (Carey, 2014). The function of this program is to provide gateways to college credit for high school students to enhance college readiness and to ease financial burdens, making college a viable pathway for all Ohio students. Nearly all funding is paid for by the state of Ohio; however, students in private schools or home school students may encounter some fees. This includes the cost of tuition, fees, instructor pay, and books. All public-school students admitted to public universities will always have zero costs for their CCP courses. Private universities can negotiate with secondary schools to determine the cost to students based on a formula used to determine a minimum and maximum price range.

All public schools are required to offer two pathways through the CCP program: one that results in 15 transcripted credit hours of accumulation, and one that results in 30 transcripted credit hours of accumulation (Carey, 2014). The courses offered in these pathways must contribute to a degree or a professional certificate. Ohio students may enroll in any college and in any courses they wish as long as the courses selected contribute to a degree or professional certificate and as long as all prerequisites for their chosen course are met; only remedial courses are not permitted to be taken as a part of CCP. These students have the option to attend classes at their high school taught by either post-secondary faculty member or a certified secondary faculty member, attend class on the college campus, or take the courses online. Courses offered that take place off the college campus must be the same as the courses that take place on campus. Secondary faculty teaching CCP courses must be provided annual professional development by the sponsoring post-secondary institute, and the partnering post-secondary institute must conduct at least one observation of all courses taught to ensure that they match the quality and culture of the post-secondary course.

Those students that apply for post-secondary courses must be deemed college ready (Carey, 2014). This measurement may be determined by a remediation free score on a standardized instrument designed to measure college readiness, such as the ACT, Compass, or Accuplacer test. However, to better meet the spirit of the function of the CCP program, schools must also look at a holistic profile of the applicants, including GPA and teacher recommendations. Once accepted, students may earn up to 30 transcripted credit hours a year, and up to 120 transcripted credit hours throughout their enrollment period in the program which may begin as early as 7th grade. CCP also stipulates that when students graduate from their secondary education and enroll in college that they do so as first-year student status for sake of determining scholarship eligibility, housing, and any other considerations.

BACKGROUND OF ACCELERATED COLLEGE CREDIT

Need for Accelerated Credit Options

For decades now, high schools have been looking for a better way to move students from high school to college. A study by Hebert (2001) indicates a recognized need for improved transition since 1971. One of the more popular and effective options utilized to help make this improvement is to provide students

with opportunities to take college level courses while still in high school. This comes in many forms including Advanced Placement (AP) courses and International Baccalaureate (IB) programs, but one of the more flexible options that has required much research is the Dual Enrollment (DE) option.

Part of the problem when it comes to needing better transition models is the lack of incentive or challenge in the final years of high school. Many students have completed most of their graduation requirements prior to their senior year and with the end in sight have no motivation to push themselves. An (2013) suggests that "senioritis" can become a contributing factor to students' remedial needs when they get to college. Additionally, Reindl (2006) reports that nearly half of high school seniors believe that their final year could be made more meaningful while 29% found their senior year to be a complete waste of time. High stakes testing has become so prevalent that much of the curriculum is now focused on ensuring that students can pass the mandatory tests to meet graduation requirements. This is a major factor that is leading to our current model of secondary education becoming outmoded and, as Vargas, Hooker, and Gerwin (2017) discuss, can no longer serve as the culminating experience for all that students will need to know by graduation. DE options can help to address this need and provide many benefits.

Several modern studies detail the benefits of DE programs for students as well as secondary and post-secondary institutions. DE can allow students to earn college credit at greatly reduced to no cost (Loveland, 2017). This can allow students to avoid costly student loans and open the door for low-socioeconomic status students that might not otherwise be able to afford college. DE courses can also provide challenging course options that typical high school classes do not provide, giving students valuable development in college level skills that they will be able to take with them when they graduate (Loveland, 2017). This would help to address the feelings of uselessness that many seniors feel about their final years of high school. It would also provide those lacking skills that would allow for a more successful high school to college transition.

According to An (2013), various studies have been completed showing that students who participated in DE programs have shown positive effects in their college GPA, persistence, and degree attainment when compared to their counterparts who did not participate. While these findings are good for students, they also demonstrate the benefits for colleges as universities will be able to report higher student success rates. Developing DE programs can provide benefits to the high schools and colleges as well by helping to align secondary and post-secondary curriculum (Loveland, 2017). Through the process of developing these alignments, the schools will also develop relationships and partnerships that might serve to allow for better transitions for students to college through admission processes, scholarship applications, and credit transfers. Possibly one of the most important benefits of DE programs come from the ability of students to explore career pathways and develop a college identity (Loveland, 2017). All the previous benefits are moot if the student does not go on to enroll in college and persist in their degree. DE programs demonstrate for the students that they can be successful in college and can find a career pathway through the college experience. Creating this college mindset can change the attitude of students towards college and change the climate of the school to one that fosters college aspirations.

Adelman's (2006) *Toolbox Revisited* reinforces the importance of accelerated credit programs through his academic momentum theory. The theory suggests that students who attain 20 or more credits by the end of their first academic year after matriculation at a university are more likely to approach the threshold of successfully completing a degree program. This is based on students who have completed more than a single AP course being ranked in the highest level of a 31-level scale of academic intensity. Adelman (2006) also suggests that students who enter post-secondary institutes with a minimum of six credit hours are even more likely to approach the threshold. According to Adelman (2006), "Six is good, 9 is better, and 12 is a guarantee of momentum" (p. 20). While Adelman does demonstrate that gaining credit prior to matriculation and attaining at minimum 20 credits by the end of the first academic year, Wachen *et al.* (2018) point out that scholars who have tested this theory do not provide agreement on the "ideal" number of credits (p. 120). With no ideal number to aim for, students have only the minimum threshold to guide their course selections and does not allow them to consider the quality of their success in persistence to a degree.

However, while the number of credits does increase persistence, Adelman (2006) also stresses the importance of the quality of the persistence. Using GPA to measure success is another important factor to

consider when looking at the effect of earning these accelerated credits. Adelman (2006) identifies academic performance marked by grades as a reflection of the quality of the effort students put into their studies and indicates that GPA is a more important factor to consider than senior test scores when looking at the overall academic resources index. This is an important consideration when you think about the longitudinal measure of GPA over the course of all the student's years compared to the immediacy of the senior test scores. This is reinforced by Mattern, Allen, and Camara (2016) who discuss GPA as "an agglomeration of many factors both cognitive and noncognitive in nature" (p.32). This factor is also worked into Adelman's (2006) theory as he indicates that earning grades in the top 40% of first-year GPA for students all entering at the same point presents a strong, positive correlation with academic momentum. He goes on to suggest that first-year GPA in the top two quintiles increases probability of degree attainment by 22%. Number of credits and GPA both play important factors in increasing persistence towards a degree, and both are benefits offered by DE programs. Struhl and Vargas (2017) confer with this indicating that enabling high school students to experience real college coursework as being one of the best methods of preparing for college success and that notable studies have found positive associations between DE course programs and college outcomes, including first-year GPA. This is mirrored in a study by Evans (2018) applied to AP courses which indicates that each additional AP credit earned increases GPA by 0.021; however, they offer no indication of the limit of this improvement. It is because of these heavily weighted factors that Adelman (2006) calls for administrators to identify their gateway courses and monitor participants to ensure that those enrolled are fully realizing their potential.

Models of Accelerated Credit Programs

One of the characteristics of DE programs compared to AP or IB style courses is the flexibility of the method of delivery. There is no one style that can be applied to describe DE courses. Depending on the course enrollment, there may be any one of several methods for the delivery of that course. The only consistent factor for a DE course is that the program will earn the student college credit for successful completion while they remain enrolled in high school prior to graduation. In a study from 2002, Parke describes the various models that can be applied to DE courses:

- Course taught at the high school during the high school day by a high school teacher with credentials from the college using a college syllabus.
- Course taught at the high school during the high school days by a college professor.
- Course taught at the university by a college professor consisting of a mixture of high school students and college students.
- Course taught by a college professor, but only high school students enrolled.
- Online distance learning taught by a college professor.

Each of these options has been demonstrated as effective according to the ODE report (2017) on CCP course results. There were no significant differences in successful student completion of courses based on the method of delivery. While the data from the ODE report reflects successful completion of the course attempted, research from Vargas, Hooker, and Gerwin (2017) suggest that students who participated in models that demonstrated a more "authentic" college experience would leave with a better understanding of what it takes to succeed in college. They go on to indicate that the actual effect of the method of delivery on post-secondary success is still unknown. Unfortunately, this early into the implementation of the CCP program, this will continue to be the case for this program until such time as students who have participated will be able to report on the status of their college success.

Typically, DE courses are offered only at the high school level, and many only to upperclassmen who have met basic graduation requirements. This model tends to cause students to not consider their academic futures beyond secondary education until their junior or senior year. This has an even more profound effect on disadvantaged students as illustrated by Roberts (2019) when she indicates that often rural students do not tend to see college as a viable pathway until towards the end of their secondary careers. This is the time when they will be exposed to these more rigorous options that will show them capable of success at such a high level. This is another area where CCP will be considered different from other DE programs as students will have the opportunity to begin course work as early as their seventh-grade year. The longevity of this

level of course work will allow students to begin considering their likelihood of success much earlier in their careers.

Criticisms of Dual Enrollment

While there are some potential benefits that can stem from offering DE courses, there are also many criticisms of the practice that must be considered. The biggest benefit of such programs are the opportunities that they can offer to students to help build their college identity. However, those students who need to build that identity the most are often not the ones able to take advantage of the programs. Reindl (2006) discovered that areas that are primarily low-income urban and rural settings tend to have very few students able to take advantage of DE programs. This keeps those students that could most benefit from taking courses early to cut their costs of attending from being able to gain the advantage the DE programs can provide. An (2013) also found that often there are very strict requirements on such programs, only allowing high-achieving students to participate. These students are likely to go on to college anyway, but students who could use the opportunity to develop that college aspiration mindset are unable to participate.

Even if all students did have access, there are still issues that researchers found that present drawbacks to offering DE courses. Vargas, Hooker, and Gerwin (2017) discuss the blurring of boundaries as a major concern. There is a worry that the transition between secondary and post-secondary could become so simplified that the two institutions become intertwined to the point that higher education is merely an extension of high school. Vargas, Hooker, and Gerwin (2017) go on to address a concern from the university perspective that if so many high school students are capable of successfully completing these college courses, that perhaps they are not truly college level. If only the highest-achieving students demonstrated this level of success, then the course rigor would not be questioned, but given the rate of successful completion of all students enrolled in DE programs, there is some doubt about whether these students are performing up to the college standard; or perhaps even worse, that the college standard is set too low. This questioning of the rigor has also led to other issues with DE credit attainment. Herbert (2001) addresses the limitation of the credit transferability where some institutions may not accept credit gained through a partnership with another university. Parke (2002) identifies another concern about the question of rigor by citing studies that indicate that some universities may not accept the credit based on the model of delivery. Specifically, some institutions may not see a high school teacher as being qualified enough to instruct a college level course. This sentiment is echoed by Mangan (2014) who articulates university professor's concerns about the lack of basic skills resulting in an increase in remedial coursework. Even if students are not enrolled in remedial courses and instead enroll in more advanced courses, students could still be missing crucial elements of their college education. Mendillo (2012) also discusses the lack of proper preparation by allowing students to bypass freshman level courses designed to guide students into the college experience and acclimate them to the expectations of college culture beyond simple academic knowledge, stating that "faculty-student interactions are not possible, and the overall value of a university education is diminished."

Critics continue with addressing the overall impact that these types of programs might bring with them. The students taking the courses could be putting themselves in jeopardy even if they are able to obtain credits. Loveland (2017) addresses the impact that these courses can have on a student's GPA; the courses are transcripted college credit, which means that a poor performance could impact their cumulative college GPA, access to scholarships, academic standing in their high school, and other factors. A student who takes a DE course and gets a "B" would be ranked lower than a student that took a similar course, but at the high school level and received an "A". Critics are also concerned about the financial responsibility of the institutions, as Parke (2002) points out that there could be potential "double dipping" with both the high school and the college receiving financing for the same course.

The CCP program does address several of these criticisms. The blanket application to all Ohio schools addresses the access issue. The development of the courses through the partnerships with university personnel and high school instructors helps to bridge the gap in rigor and perceptions of delivery, especially with the accreditation process where the courses must be reviewed periodically by the college faculty. The students are offered more incentive to take the courses as the DE courses in which they enroll are now

weighted equivalent to AP courses so that they can see a boost in GPA when they enroll in these more rigorous course options. The finance issue is handled by the delivery of funds through the CCP formula for determining how much the courses will be. In addition to these elements, some of the criticisms can be addressed through the results of various studies on the impact of DE courses. Finally, the concerns about lacking a true college experience can at least be partially assuaged as the students will have to have demonstrated college level ability prior to enrolling, and the students will be required to take the exact college courses and meet the same college course requirements as those offered on the university campuses. In some cases, students will even be taking the courses on the university campuses.

However, despite these improvements CCP presents its own concerns for administrators at both the local school district (LSD) and the Institute of Higher Education (IHE). Hornbeck and Malin (2019) conducted a survey that demonstrated concern from district superintendents about the financial burden that providing students access to CCP courses put on their districts despite expressing that they feel their students are benefitting from the program. Deever (2017), reporting on CCP implementation developing academic partnerships between LSDs and IHEs, pointed out the concerns about cost of CCP courses with LSD being expected to cover the cost of tuition and books, while IHE receive only a percentage of traditional tuition fee causing stress for both entities. The question remains then whether the benefits of CCP are quite literally worth the price of admission.

Previous Study Contributions

Several studies have explored the impact that AC courses can have on students. Repeatedly, these studies have demonstrated results in favor of AC programs, but there is a lack of parameters to determine the window of effectiveness when considering the previously uncharted levels of customization that CCP offers. In one such study Parke (2002) cites a study that indicates entering freshmen who had completed DE courses earned higher GPAs than other first-time, first-year students. Those who completed DE courses earned 3.53 average GPA and non-participants earned an average 3.21 GPA. Parke (2002) goes on to examine a specific program and compares GPAs across three groups: dual enrolled high school students, university freshmen, and university non-freshmen. The study applied an ANOVA and Sheffe's method for post hoc group comparisons in the seven high enrollment courses across the three groups. The findings demonstrated significantly greater grades for dual enrolled students compared to the university freshmen group, and comparable or occasionally slightly higher grades for dual enrolled students compared to university non-freshmen. The study helps to confirm the research that dual enrollment can lead to higher GPA, but it should also be noted that participants in the dual enrollment program were from the top third of their class. When applied to a more widely enrolled program, these findings may not be able to be generalized.

An (2013) conducted a study that attempted to control for confounding variables that might allow for better generalization. This study focused on the dependent variables of college student's first-year GPA and college readiness, which is defined based on need for remedial courses in college. An (2013) controlled for confounding variables such as race, gender, family background, family structure, number of siblings in college, nativity, language spoken at home, and age. An (2013) coded each of these variables and included aspects of academic influences such as high school GPA and SAT scores. ACT scores were converted to SAT to maintain consistency in measurement. 20 imputations were developed to ensure that all data was integrated, and then An (2013) estimated a selection equation to address a propensity score matching model for all latent variables that might influence participation in DE. The next step was to apply a sensitivity analysis to address unobserved confounding variables. The results of An's (2013) study indicate that after all accounting, DE students showed that students who participated in DE averaged 0.11 higher GPA's than non-DE students, and DE students were six percentage points lower in their need for remediation than non-DE students. This study demonstrates a better generalization of the overall effectiveness of DE options on college readiness.

While these studies all focus on providing a quantitative demonstration of how DE courses can impact student performance and college readiness, Kanny (2015) developed a qualitative study that focused on analyzing student perceptions on how DE courses affected them. Kanny's (2015) study was based on

grounded theory and developed to determine the perspectives of students from an urban setting attending DE courses that were delivered on a college campus through a series of interviews. Kanny (2015) found that students were positively impacted through experiencing more exposure to the college environment, learning hidden curriculum, and being forced to adjust to the increase in independence and freedom. However, there were also negative impacts from the program as students also experienced issues with credit achievement and grades, negative social interactions with others, and limited support systems. This study contributes greatly to the literature on the topic through its unique lens of providing a student perspective. However, the narrow scope of the urban setting and only focusing on courses provided at the college campus make it difficult to generalize the findings when applied to other demographics of students and other delivery methods of DE courses.

In a case study of DE college chemistry courses, White, Hopkins, and Shockley (2014) found that DE students demonstrated equivalent content knowledge to traditional college students, but with a higher completion rate. Unlu, et al (2015) conducted a study of early college high school districts in North Carolina to examine the cost and benefit of such a DE program. The study demonstrated increasing enrollment in postsecondary enrollment through exposure to college while in high school. The analysis also demonstrated an impact on societal benefits related to higher education attainment. Pierson, Hodara, and Luke (2017) report that students who took accelerated credit courses had higher enrollment, persistence, and GPA than non-enrolled students. Fowler and Luna (2009) discuss using DE to bridge gaps between high school and college by ensuring that students do not repeat high school coursework during their first years of college, and students can prepare for the rigors of college level work. These benefits lead them to suggest that secondary education leaders can take an active role in school improvement by encouraging DE.

Despite these various studies that demonstrate the benefits of schools utilizing AC programs from AP to DE, Struhl and Vargas (2012) suggest that the field knows little about how different aspects of college course taking experiences may affect outcomes. In their study, they discuss the importance of understanding key choices in the design of DE programs when considering how to refine and improve college readiness. In their pursuit to expand on the field's knowledge of the different aspects of DE programs, Struhl and Vargas (2012) ask a similar question to one posed by this study: Does college success vary by type or number of courses completed? Their study demonstrated the following:

- ELA course participants were 2.75 times as likely to enroll in college than completing no DE courses and 2.21 times as likely for completing any DE course; ELA had no statistically different outcome for college completion.
- Vocational course participants were 1.53 times as likely to enroll in college and 1.37 times as likely to complete college than completing no DE courses vs 1.68 times as likely to complete for any DE course enrollment.
- Math courses demonstrated no statistical difference in likelihood to enroll in or complete a degree program.
- Overall, more courses provided larger benefits (Any DE enrollment - 1.67 to enroll, 1.43 complete; 1-2 ELA or Math - 1.78 enroll, 1.72 complete; 2+ ELA or math - 1.89 enroll, 1.83 complete)

In another study, Garcia, et al. (2018) found that early college high school students from a specific district in the Lower Rio Grande Valley who received less than nineteen credit hours were less likely to persist in obtaining a bachelor's degree than students who received more than nineteen. The study examined three variables: <19, 20-39, and >40. The study demonstrated a significant difference between <19 at .27 and 20-39 at .76, and between <19 at .27 and >40 at .77. This helps to back up Adelman's (2006) academic momentum theory. The data provided by these previous studies does lend credence to the questions posed in this study as being data points that will demonstrate positive results. However, due to the more expansive range of options and the number of credit potential being much higher than previous studies, this study will seek to contribute to the field by providing a wider lens from which to view these items. In addition, this study will be examining the effects of the quality of these aspects rather than just the impact on quantity.

The use of GPA as a metric for examining the quality of the student's college readiness can be demonstrated in two other previous studies. Long, Conger, and Iatarola (2012) found in their study on the

effects of high school courses on postsecondary success that taking rigorous coursework raised the number of cumulative credits that students earned by 4.6-8.4 credits and student GPA by .09-.14. They also point out that a study by Jones and Jackson in 1990 revealed that a single point of increase in college GPA could raise postbaccalaureate earning potential by 8.9%. This becomes very relevant when looking at Wilson's (2016) examination of CCP policy. Part of the examination looks at the economic development aspect of the policy, which not only seeks to reduce student degree costs, but also increase the student's ability to earn either industry credentials or some form of postsecondary degree. The impact that CCP has on postsecondary GPA then will impact the overall contribution to economic development offered by the CCP program.

STATEMENT OF THE PROBLEM

Because Ohio's new CCP program has replaced all the dual enrollment options in Ohio schools, there is a need to determine the program's effectiveness in preparing students for the college experience. Currently, there is little scholarly research, currently consisting of two dissertations by Wilson (2016) and Roberts (2019) and an article by Dever (2017), to develop a clear understanding of what effects the various aspects of individualization in this program has on its participants' preparation for enrolling and being successful in college. There is a need for research to help determine what CCP factors contribute to students' readiness for completing a college program. The flexibility of the CCP program affords researchers a wide range of variables to study, with the goal of identifying aspects of the program that enable students to identify a pathway to achieve desired outcomes.

While schools do build out a 15-credit hour pathway and a 30-credit hour pathway, these are merely ready-made examples for students to take, or at least to use as a model for how to build their own path. Students have the option of building any sort of schedule they wish beginning as early as 7th grade. Reports from CCP (2017) show that the average number of hours students took during the 2016-2017 school year was 2.58 credit hours of coursework. However, the current Director of the College Credit Plus program has indicated a rise in the number of students taking course loads that qualify them for full-time enrollment status (personal communication, 9/20/2018). While Adelman (2006) reports that students who earn at least 20 credit hours of coursework in their first year of college increases the likelihood of persistence towards a degree, it is unclear how this trend would be influenced by credit hours gained prior to enrollment, nor does it address how this might influence student success in relation to performance. It is also reported that students in the top 40% of GPA in their first year of college are more likely to persist (Adelman, 2006), but it is unclear whether the number of CCP credit hours completed predicts first-year GPA. There is a need to understand how CCP credit hours taken in high school are related to metrics of post-secondary success.

In addition to the number of credit hours a student takes, CCP allows students to begin taking courses as early as 7th grade (Carey, 2014). This creates a variable that has not been assessed by the CCP organization to determine the effects that prolonged exposure to CCP courses might have on its participants. While the most recent CCP Annual Report (2017-2018) does demonstrate the GPA levels of students who took CCP courses in each academic year and even compares them to non-CCP students, there is no data comparing the GPA of students who only took courses in their senior year prior to matriculation to an IHE and students who had been taking courses since they became available in the 2015-2016 academic year.

Finally, the variability in the types of courses students may include in their CCP pathway may also affect student outcomes in post-secondary study. While CCP protocol will not permit students to enroll in developmental or remedial courses, a wide range of other types of courses are available, if prerequisites are met, and proper approval has been granted by the IHE. Students can enroll in non-remedial general education courses, baccalaureate program courses, and courses required for professional certifications. Educators advising students on constructing their CCP pathways could benefit from an analysis of the types of coursework that have the most significant impact on a students' ability to be ready for college success.

Definition of Terminology

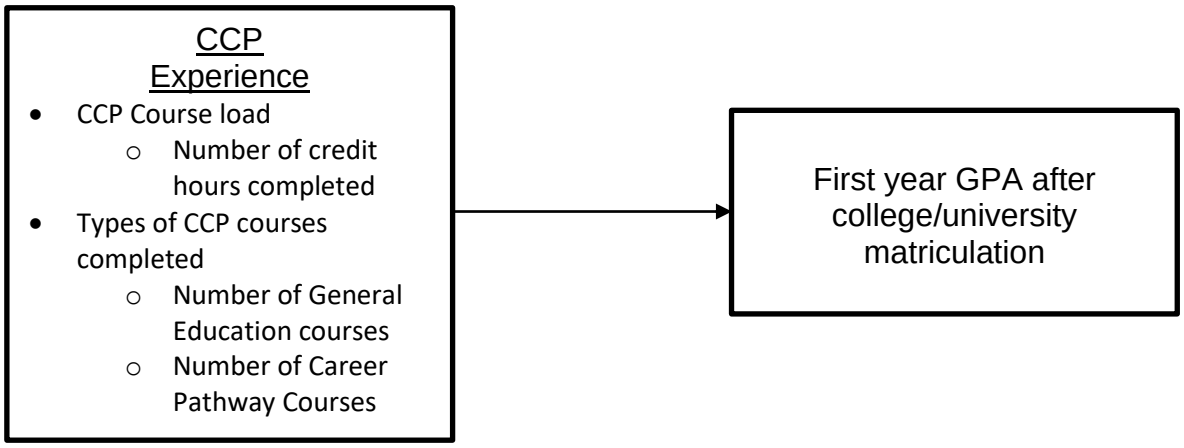
To facilitate understanding of the variables operationalized in this study, the following definitions are provided:

- *Accelerated Credit Program* – any program that offers secondary students an opportunity to earn postsecondary credit prior to graduation from their secondary institute.
- *Institute of Higher Education (IHE)* – the degree granting institute partnering with the secondary institute, whether through requirement or desire, to offer post-secondary credit.
- *Ohio Department of Higher Education (ODHE)* – Governing body of IHE's in Ohio.
- *College Credit Plus (CCP)* – Ohio's new dual enrollment program instituted in the 2015-2016 school year and designed to help increase college level readiness and open pathways to college for high school students.
- *College success level* – the level of college success in this study will be measured by students' cumulative GPA in their first year after matriculating at a college or university following completion of CCP courses.
- *CCP Course Load* – The total number of credit hours a student completed through the CCP program through the course of their academic careers prior to matriculation to a university.
- *Type of CCP Course* – This will be a designation for determining a categorization of the courses that CCP students completed to determine if one classification of courses has a greater predictive utility than another: either General Education courses or Career Pathway courses.
- *General education courses* - This designation of type of CCP course will refer to any course that would meet a general education requirement for a university, in this case any class identified as English, math, science, or social studies.
- *Career pathway course* – This designation of type of CCP course will refer to any course that would be required for the completion of a baccalaureate degree or would award any sort of professional certificate, in this case any class not designated as either English, math, science, or social studies.

THEORETICAL FRAMEWORK

This study tested the predictive utility of three dimensions of the CCP program with respect to students' college success as operationalized by their first-year GPAs after university matriculation (see Figure 1).

FIGURE 1
THEORETICAL FRAMEWORK



This study explored the predictive utility of three aspects of the CCP program with respect to students' first-year GPA upon matriculation to a university. Each predictor was analyzed on its own merit. This permitted assessment of the independent effects of each IV on the DV without interaction with the other predictors of college success as operationalized by students' GPA in the first year following college or university matriculation. The study also assessed the interaction or cumulative effects of two predictor variables, to determine whether the type of CCP courses taken had a differential impact on GPS. Finally, the study assessed the differential amount of variance in GPA determined by factors found to predict first-year college GPA. Results of this study may help direct educators' attention to aspects of the CCP program that have the greatest potential to predict future academic success at the post-secondary level.

The first predictor tested was "course load" operationalized as a continuous variable. This reflected the potential for students to design their own pathway and to analyze the relationship to students' college success across the entire range of course loads, to see if there is a linear relationship between the number of CCP courses taken and academic performance assessed by first-year college GPA. The second predictor was "exposure over time to CCP courses" also operationalized as a continuous variable to determine whether the number of years students spent completing CCP courses predicts first-year college GPA. This would have determined whether there is a linear relationship between the extent of exposure to CCP courses over time and subsequent academic success in college. The third predictor examined whether one or the other "type of CCP courses" taken, categorized as either general education courses or career pathway courses, was a better predictor of future academic success as assessed by first-year college GPA. Together, these calculations provide a window into the predictive utility, if any, of these three predictor variables based on students' participation in CCP program on first-year student success upon matriculation to a college or university.

Research Questions

Five research questions were addressed in this study of the predictive utility of three dimensions of the CPP program with respect to student's first-year college GPA:

RQ1. *Is there a statistically significant relationship between students' first-year college or university GPA and the number of credit hours a student completed through Ohio's CCP program?*

RQ2. *Is there a statistically significant relationship between students' first-year college or university GPA and the number of general education courses a student completed through Ohio's CCP program?*

RQ3. *Is there a statistically significant relationship between students' first-year college or university GPA and the number of career pathway courses a student completed through Ohio's CCP program?*

RQ4. *Is there evidence of an interaction between the type of CCP courses completed, general education vs. career pathway, and first-year college or university GPA?*

RQ5. *Among students who enroll in both general education and career pathway courses, which type of course accounts for more of the variance in first-year college or university GPA?*

To address RQ1-3, the following five directional hypotheses were tested:

H1*: There will be a positive linear correlation between first-year college GPA and total number of CCP credit hours completed.*

H2: *There will be a positive linear correlation between first-year college GPA and the total number of general education courses completed through CCP.*

H3*: There will be a positive linear correlation between first-year college GPA and the total number of career pathway courses completed through CCP.*

Instrumentation

Archival data obtained from the ODHE were analyzed for this study. The ODHE collects data annually from secondary institutions throughout the state of Ohio. Secondary schools submit data specified by the ODHE addressing Student Data, Alternative Funding, Course Outcomes, College Readiness Assessment, and Student Demographics. For this study, ODHE prepared an anonymized data file containing only the data required to address the research questions. All personally identifying information was replaced with a randomly assigned unique identifier to preserve the anonymity of CCP participants. The resulting data file included the following data from 2019: number of CCP credit hours completed; number of courses taken at the General, Developmental, Technical, Bachelors, and Masters levels; and GPA for Summer 2018, Fall 2018,and Spring 2019.

DATA ANALYSIS

Sample

The ODHE provided raw data for 23,985 participants in Ohio's College Credit Plus (CCP) program who were eligible for college matriculation in Spring 2019. Data for 594 students who did not matriculate in 2019 were removed from analysis because they included no first-year college GPAs to examine as the dependent variable, reducing the sample to 23,391. Examination of the extracted dataset revealed 147 outliers in the GPA data, for whom the average reported was over the standard 4.0 scale. All data for these cases were omitted from analysis to maintain consistency, bringing the total number of participants for whom complete data were available for analysis to 23,244.

Preliminary Calculations

Additional calculations were performed to produce the required variables for analysis. The total number of general Education courses was calculated by summing the number of General and Developmental courses. The combined General Education course category includes all introductory level courses typically taken by undergraduates. Similarly, the number of Technical, Bachelors, and Masters courses were summed to produce the total number of Career Pathway courses. The combined Career Pathways category includes all specialized courses that would only be taken by students pursuing a specialized degree, licensure, certification, or occupation. Finally, a Cumulative GPA was calculated for each participant by averaging GPAs for Summer 2018, Fall 2018 and Spring 2019.

Descriptive Statistics

Descriptive statistics were calculated to test for normal distribution (see Table 1).

TABLE 1
DESCRIPTIVE STATISTICS

	N	MIN. STATISTIC	MAX. STATISTIC	MEAN	STD. DEVIATION	SKEWNESS		KURTOSIS	
						Statistic	Std. Error	Statistic	Std. Error
CCP HOURS COMPLETED	23244	0	116	15.70	14.4242	1.824	.016	3.981	.032
GENERAL ED COURSES	23244	0	32	4.07	4.068	1.914	.016	4.800	.032
CAREER PATHWAY COURSES	23244	0	33	1.51	2.161	2.770	.016	12.830	.032
CUMULATIVE GPA	23244	.06	4.0	3.02	.81433	-1.122	.016	.962	.032

The number of CCP hours completed ranged from 0 (since it would be possible for participants to attempt taking a course, and thus be counted in the study, but not successfully complete the hours) to 116, with a mean of 15.70 hours completed. The number of General Education courses taken through CCP ranged from 0-32 with a mean of 4.07 courses taken. The number of Career Pathway courses taken through CCP ranged from 0-33 with a mean of 1.51 courses taken. The Cumulative GPA for the first year after university matriculation ranged from .06 to 4.0 with a mean of 3.02. For all four variables, skewness tested at .016 standard deviation of error, and kurtosis tested at .032 standard deviation of error. As neither of these standard deviations were approaching 1.0, normal distribution could be assumed, permitting parametric correlation to be used for subsequent inferential analyses.

Inferential Statistics

Pearson's correlation was used to test for linear associations between the various predictor variables and the outcome variable, Cumulative GPA (see Table 2). The number of CCP credit hours completed was positively and significantly correlated with first-year GPA after college matriculation, r^2 (23,244) = .125, p < .001. The number of General Education courses participants took through CCP was also positively and significantly correlated with first-year cumulative GPA after college matriculation, r^2 (23,244) = .064, p < .001. at college. Similarly, the number of Career Pathway courses a participant took during CCP was positively, and significantly correlated with first-year Cumulative GPA after college matriculation, r^2 (23,244) = .054, p < .001. Because both types of courses demonstrated statistically significant positive correlations, Fisher's Z-test was used to determine if the slopes of these two correlations were statistically different. Results of the Fisher's Z were non-significant, Z (d.f. = 23241) = 1.082, n.s. because it falls short of the critical value of 1.96 for a two-tailed test at p <. 05. Thus, no significant difference was observed between the slope of the correlations of first-year GPA with General Education vs. Career Pathway courses.

TABLE 2
CORRELATIONS BETWEEN PREDICTOR VARIABLES AND FIRST-YEAR GPA

2-tailed test d.f. = 23,242	**TOTAL CCP CREDIT HOURS COMPLETED**	**CCP GENERAL EDUCATION COURSES COMPLETED**	**CCP CAREER PATHWAY COURSES COMPLETED**
FIRST-YEAR CUMULATIVE GPA	.125*	.064*	.054*

* p < .001

A regression model was tested to determine the proportion of variance in cumulative GPA accounted from by the number General Education and Career Path courses taken in the first year of college matriculation. Results are presented in Table 3. The overall regression model was significant, R (2, 23241) = .072, p < .001. Based on the analysis of standardized beta-coefficients, the number of General Education CCP courses explained a greater amount of the overall variance in GPA (.051) than the number of Career Pathway courses taken (.036).

Summary of Findings

All three stated hypotheses, relating to RQs 1-3, were supported by the results of this study. First-year cumulative GPA after college matriculation was positively correlated at p < .001 with total CCP Hours (RQ1, H1), number of General Education courses (RQ2, H2), and number of Career Pathway courses completed (RQ3, H3). Results of the Fisher's Z-test found no significant difference in the slope of the correlations between GPA and General Education versus Career Pathway courses, indicating the absence of an interaction (RQ 4). Regression analysis revealed that for students who took both types of courses the

number of General Education CCP courses accounted for more of the variance in Cumulative GPA during their first year of college matriculation than Career Pathway courses (RQ5).

TABLE 3
REGRESSION MODEL

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.072	.005	.005	.81226	.005	60.314	2	23241	.000

ANOVA					
	Sum of Squares	Df	Mean Square	F	Sig.
Regression	79.585	2	39.793	60.314	.000
Residual	15333.550	23241	.660		
Total	15413.136	23243			

COEFFICIENTS								
	Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.	Correlations		
						Zero-order	Partial	Part
(Constant)	2.960	.008		379.988	.000			
Gen Ed	.010	.001	.051	7.286	.000	.064	.048	.048
Career Pathway	.014	.003	.036	5.128	.000	.054	.034	.034

INTERPRETATION AND IMPLICATIONS

Interpretation of Research Questions

This study examined five research questions assessing the relationship between taking courses through Ohio's College Credit Plus (CCP) program and first-year college GPA. Research questions explored the impact of two distinct types of educational opportunities afforded participants in the CCP program: general education and career pathway courses. Analysis of data obtained from the Ohio Department of Higher Education (ODHE) provides partial support for the study's research questions.

RQ1 is supported by a statistically significant correlation between students' first-year college GPA and the total number of credit hours students completed through the CCP program (r^2 (23244) = .125, $p < .001$). While this correlation indicates a strong association between GPA and the number of CCP credit hours completed, no conclusions can be drawn from these results about the causal effect of completing CCP credits on GPA, since no comparative data for students not completing CCP courses were analyzed. Further research is required to rule out the possibility that students who already have the capacity to earn a higher GPAs were more likely than those with lower GPA capacity to take CCP courses. Analysis of comparative data is needed before any conclusions can be drawn regarding causality.

Similarly, RQ2 is supported by a statistically significant correlation between first-year college GPA and the total number of general education and developmental courses taken through Ohio's CCP program (r^2 (23, 244) = .064, $p < .001$). While this result indicates a strong association between first-year GPA and taking CCP General Education courses, no conclusions can be drawn about causality, or the effect of taking CCP General Education courses on first-year GPA until causality and directionality have been determined.

RQ3 is also supported by a statistically significant correlation between first-year college GPA and the total number of Technical, Bachelor's, and Master's courses taken through Ohio's CCP program (r^2 (23244) = .054, $p < .001$). Based on this strong correlation we can predict that students who take more CCP Career Pathway courses are likely to earn higher first-year college GPAs. But being able to predict this outcome

does not equate to establishing cause. Without future research specifically designed to assess causality, no conclusions can be drawn regarding the effect of taking CCP Career Pathway courses on first-year GPA, due to the correlational nature of the analysis in this study, and the absence of comparative data.

With respect to RQ4, no significant difference was found between the correlation of first-year college GPA and general education versus career pathway courses. Fisher's Z- test demonstrated the correlation between GPA and General Education was not significantly different than the correlation between GPA and Career Pathway courses $Z = 1.082$, n.s. These results indicate there is no interaction between the type of CCP courses taken and subsequent first-year GPA.

Finally, RQ5 was supported by regression analysis in this study, which found more variance in GPA was accounted for by taking CCP General Education (.051) than Career Pathway (.036) courses, $F = 60.314$ ($p < .001$). Thus, while no causal conclusions can be drawn from these results, findings indicate that among those students who elected to take both General Education and Career Pathway CCP courses, the students with higher first-year GPAs elected to take more General Education than Career Path CCP courses.

Discussion of Implications

This study provides preliminary correlational evidence of an association between taking CCP courses in high school and first-year GPA among students who go on to matriculate in a college or university. However, the correlational nature of these finds does not permit any causal conclusions to be drawn regarding the effect of taking CCP courses on subsequent post-secondary GPA. The strong positive correlations found in this study do suggest further research is warranted to investigate causal hypotheses related to propositions advanced by Adelman (2006) and other researchers in the field, who postulated that students who earn at least 20 credits by the end of their first year of college, and who began that first year with credits already under their belt, will achieve higher levels of college completion. First-year GPA may be an early indicator of such success, so it is important to conduct comparative analyses to determine whether students who take CCP courses earn higher first-year college GPAs than students who do not take CCP courses, something this study did not address. Additionally, longitudinal research is needed to determine whether students who take CCP courses earn higher first-year GPAs than they would have if they had continued taking high-school level coursework instead of enrolling in CCP courses. Although the correlational findings in this study are strong, both comparative and longitudinal follow-up research is required before any conclusions can be drawn regarding the causal effect of taking CCP courses on first-year college students' GPA or on any other markers of college success.

Participants in this study included students who entered their first year of college with as many 116 credit hours already earned through CCP. Results found the number of CCP credits, number of general education courses, and number of career pathway courses taken through CCP all predicted higher first-year GPA and taking general education courses accounted for a greater portion of the variance in GPA than did career pathway courses. In practice, this indicates that among students participating in the CCP program in 2019, those who earned higher GPAs in their first year in college had taken more CCP courses in high school and were more likely to have taken general education courses than career pathway courses. These findings suggest that college success is predicted by the number of CCP courses a student chooses to take in high school, and that general education CCP courses may have a greater appeal to college-bound students with strong academic credentials than do career pathway courses.

Nevertheless, the finding of no statistically significant difference between the correlation of General Education and Career Pathways courses and first-year college GPA, indicates the difference in variability accounted for by each is within the margin of error. Both types of courses are positively associated with first-year GPA. While the difference is not statistically significant, it may be that students who prioritize general education courses in CCP have already taken the majority of courses first year undergraduates typically take, while those who prioritized career pathway courses must complete these courses in the more competitive college environment. Importantly, these results do not speak to the potential advantages (or disadvantages) of taking CCP courses, because the effects of taking CCP courses were not compared in this study to the GPAs of college-bound students who did not take CCP courses. Thus, the results of this study, while encouraging, cannot be interpreted as indicating any advantage of taking CCP courses specifically,

over simply taking more high school courses before entering college. This issue is further addressed in the discussion of future research opportunities below.

Limitations

The principal limitations of this study stem from: 1) the correlational nature of the research design, and 2) the lack of comparative data from students who did not participate in the CCP program and subsequently matriculated in a higher education institution in Ohio. The correlational results of this study cannot be interpreted as demonstrating whether participation in CCP has a causal effect on first-year college GPA. Nor do the positive results of this study rule out the possibility that simply taking more courses of any type, whether CCP or regular high school courses, would have the same positive correlation with first-year college GPA. Thus, while positive correlations were observed between student participation in CCP and first-year college GPA, no causal interpretation can be made that participation in CCP affected first-year college GPA. It may be that students who elected to participate in CCP would have achieved the same first-year college GPA regardless of whether they took regular high school courses or dual credit courses in high school. Additionally, it may be that students who did not participate in CCP who later matriculated in college achieved a comparable GPA to those students who did take CCP courses. Determining whether taking CCP courses in high school is a causal factor in determining first-year college GPA will require additional research of a comparative and longitudinal nature.

This study was also limited in scope to participants in Ohio's CCP program who have matriculated at a university in the state of Ohio. The results of the study may not necessarily generalize to the impact of similar programs on students' college success in other states. In particular, the analyses reported do not account for students who matriculated at universities outside of Ohio, or for students who did not matriculate at a post-secondary institution in the year after high school graduation, as they produced no first-year GPAs for analysis. The study results are also limited by the potential influence of other demographic factors not controlled for in the analysis, such as socioeconomic status, race and ethnicity, or any cultural influences. The data were limited to a single academic year from 2018-2019. No results were available for students who participated in the CCP program and matriculated at a university in a prior academic year.

Suggestions for Future Research

This study is important for having demonstrated strong positive correlations between participation in Ohio's CCP program and first-year college GPA among students who elected to take CCP courses in 2019. These results provide powerful impetus for pursuing future studies addressing a number of unanswered questions regarding the causal effects of taking CCP courses. First, when it comes to credit hours completed, this study did demonstrate a positive and significant correlation with first-year GPA. However, it is important to conduct comparative and longitudinal studies to establish whether there is a causal relationship between these variables. If causality is confirmed, it would then be worth establishing whether there is a peak effect of CCP participation on first-year GPA. Additionally, it would be valuable to determine whether participation in CCP is associated with other indicators of post-secondary success, such as persistence to graduation or post-graduate performance.

Another area of inquiry not examined in this study concerns the question of whether the length of time spent taking CCP courses (i.e. calendar days) is differentially correlated with first-year college GPA, for those students taking the same number of credits. At the time of this study, the Ohio Department of Higher Education (ODHE) could only provide 3 years of data. As the program continues, data will be available for students who have been enrolled in CCP courses for up to six years prior to matriculating at a college or university. This phenomenon bears further examination as these students move into institutions of higher learning to see if their exposure to CCP courses over time demonstrates a significant influence on GPA and other markers of success in institutions of higher learning.

While no difference was found in the strength of correlation between first-year college GPA and the type of CCP courses taken, the finding that general education courses accounted for a greater proportion of variance in GPA than career pathway courses does warrant further study. Questions remain about whether

there is a differential effect on GPA for students who prioritize general education courses before progressing to take a career pathway course, compared to those who take career pathway courses first. Including data about course progression in future analyses could shed additional light on the differential benefit of these types of courses on preparation for success in higher education.

Additional opportunities exist to supplement this quantitative study with qualitative inquiries about the experiential impact of participating in Ohio's CCP program on subsequent college success. The unique opportunities provided by CCP bear scrutiny at a more personal level to examine students' perceptions when it comes to how this program has prepared them to succeed in institutes of higher education.

Finally, having demonstrated a positive association between participation in CCP and first-year college GPA, follow-up comparative studies are warranted to determine whether these associations are unique to CCP courses, or related to simply taking more courses of any type. Such follow-up studies are essential to determine whether the correlations observed in this study reflect any differentiated effect of CCP courses or any underlying causal effect of the CCP program in particular. Of highest priority is conducting follow-up research to determine if there is any differential effect of taking CCP courses, versus continuing in traditional high school coursework, for those students who go on to matriculate in higher education. This follow-up research is essential for determining whether the mere act of taking two additional years of coursework beyond the junior year (whether traditional high school courses or CCP), may be the cause of the correlations reported in this study.

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