Exploring the Effect of Inviting Students to Enroll in Advanced Placement Courses: Can Creating a More Welcoming Environment Increase Enrollment?

Steven D. Meek
B.S.E., Central Missouri State University, 1999
M.A., University of Central Missouri, 2008

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Harold B. Frye, Ed.D.
Major Advisor

Sharon Zoellner, Ph.D.
Committee Member

Kristina Martin, Ed.D.
Committee Member

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Abstract

This study examined the propensity of students to enroll in Advanced Placement (AP) classes after sitting down with a school staff member to learn about the benefits and receive a formal invitation into these classes. Additionally, this study focused on male students, who are often underrepresented in advanced classes like AP and studied the likelihood of them enrolling in an AP class after receiving a formal invitation. The researcher conducted this study by reviewing the archived data of a school district that had identified Grade 10 students who had the potential to be successful in AP classes through their cumulative GPA, daily school attendance, Algebra I End of Course (EOC) exam scores, and the Scholastic Reading Inventory (SRI) scores. Those students identified then met with a school staff member who provided information about AP classes, reviewed their academic information, and invited them to enroll in AP classes for the next school year. The researcher then reviewed the enrollment data to determine which students enrolled in AP courses for the following year.

These data were compared to student data from the previous four years when students had not received invitations. The researcher identified Grade 10 students from each of these years who met the same criteria for having the potential to be successful in AP courses and compared these findings with the enrollment data when students did receive invitations to examine if there was a relationship between these formal invitations and enrollment in AP courses.

Dedication

To Olivia and Henry, who brighten my path. To Jami, who lights my sky.

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Table of Contents

List of Tables

Chapter 1

Introduction

Between 1998 and 2018, the number of high schools offering Advanced Placement (AP) courses nearly doubled from 12,486 schools to 22,612 (College Board, 2018). The number of students who sat for an AP exam rose from 635,168 to over 2.8 million students (College Board, 2018). Schools are motivated to offer AP courses because they provide the opportunity for students to earn college credit and push more students to achieve college readiness. Despite the popularity of these programs, there are still members of the high school student population, particularly male students, who are underrepresented in AP courses (College Board, 2018). Part of this issue is due to some schools not offering these programs. Theokas and Saaris (2013) report that suburban and urban schools are far more likely to offer AP courses compared to rural schools, and nearly all large high schools across the United States offer at least one AP class, while less than half of the small schools in the country offer AP.

Additionally, some groups of students are less likely to access these courses than others, even though the school they attend offers AP courses. In examining data from 2013, the NCES (2017) found that 72% of Asian-American students took at least one AP or IB course compared to 40% of white students. The participation rates of black and Hispanic students were significantly lower with 23% of each group taking AP and International Baccalaureate (IB) courses. Data provided by the College Board (2018) regarding students who sat for AP exams showed that 54% of the students who took an AP exam were female and 46% were male. Schools across the nation continue to seek ways to narrow these participation gaps with varying degrees of success. Lewin (2006)

describes a school in North Carolina that gave scholarships, laptop computers, and even the opportunity to win a car to students who passed three or more AP exams. As a more modest approach, the College Board (2015), which administers the AP program, advises schools to encourage students to take AP courses by having one-on-one conversations with students and personally inviting them to take these courses. The focus of this study examined how effective these meetings are in motivating students to enroll in AP courses.

Background

The AP program is a collection of 38 courses that are designed to deliver challenging, academic work to high school students and align with college coursework (AP Central, 2018). Each of these AP courses concludes with an examination, referred to as an AP exam, which tests students' mastery of the coursework. Exams are scored on a 1 to 5 scale, and colleges that recognize AP scores typically will give college credit for a score of 3 or higher. This opportunity to earn college credit while still in high school is one of the key points high schools focus on when speaking to students about enrollment in AP courses. College readiness is another key point used in motivating high school students to take AP courses. Scott, Tolsen, and Lee (2010) found that students who took AP courses in high school had a higher GPA in their first year of college than students who did not take AP courses. Similarly, McCauley (2007) found a significant positive relationship between students who took AP or dual-credit courses in college and then successfully earned an undergraduate degree in under six years. Because of these benefits, districts are continually looking for ways to motivate more students who have the potential to be successful in these courses to actually enroll in them. The College

Board (2015) suggests that schools adopt an open enrollment policy that avoids the use of too many prerequisite courses, grade-point average requirements, or teacher recommendations to limit students' enrollment in AP courses.

Unfortunately, some students may lack the confidence to enroll and feel they do not have the ability to be successful. Based on the student makeup of these courses, some students may feel they are not the type of student who belongs in advanced courses like AP. The College Board (2018) shows a significant overrepresentation of girls taking AP exams compared to boys, with representation gaps in gender as high as 26% in some courses. Similar to schools across the nation, the school involved in this study had a clear gender disparity in students taking AP exams with 175 female students taking at least one AP exam in 2019, compared to 131 male students (College Board, 2020).

Statement of the Problem

The College Board (2015) and some groups such as Hanover Research (2015) encourage schools to take direct action in enrolling students for AP courses by creating a more welcoming environment, so students see these courses to be as much for them as other students. McNeil (2007) described an initiative from the National Governors Association (NGA) to develop a pilot program conducted in twenty-nine high schools across six states that actively recruited students to take AP courses. Schools taking part in this program mailed letters home to parents, provided open houses, and hosted information nights to educate students and their families about the benefits their children could see by taking AP courses. In this study of 8,365 students, McNeil (2007) reported that schools taking part in this program saw a 27% increase overall in AP course enrollment.

Extending on McNeil's study, other approaches are worth studying to examine their effect on increasing AP course enrollment. As reported by Stroman (2019), one possible way to encourage enrollment in advanced courses like AP is for schools to create a more welcoming environment and reinforce confidence in students' academic achievement. This might be done by sitting down with students individually, discussing their academic achievements up to that point, and inviting them to enroll in the courses as suggested by the College Board (2015). It is possible that by showing students hard data on their potential to be successful in AP courses, students may be more likely to take up these challenges. Unfortunately, most studies only focus on the different ways students are discouraged from taking advanced courses such as negative peer influences and lack of knowledge about AP courses (College Board, 2002; Fluker, 2018; Wang & Degol, 2016). Beyond the College Board's (2015) work to identify methods to increase AP course enrollment and some independent reporting on different school districts' attempts to motivate students to enroll in AP courses (Stroman, 2019; McNeil, 2017), little research has been done on the impact of sitting students down to examine their academic record and formally inviting them to enroll in courses.

Communities are becoming increasingly critical of school districts' problems with equity and one call for action is to provide greater opportunities for diversity in advanced courses like AP (Peetz, 2019; Nagusky, 2019). Because these courses are understood to be the courses that students should be taking to prepare for the challenges of college, there is a demand for these courses to have a variety of students in them. When some student groups are underrepresented, schools are sending a subliminal, unintentional message that some students are more valued than others (Nagusky, 2019). Data provided

by the College Board (2018) reveal that gender disparities also exist in AP courses. In 2018, female students outnumbered their male counterparts by 12% in the overall number of AP exams taken (College Board). Due to the gender disparities in AP courses, it will be interesting to examine the impact of sitting down with students, particularly male students who are a part of these underrepresented groups, and formally inviting them to enroll in these courses.

Purpose of the Study

The purpose of this quasi-experimental, quantitative study was to explore the effect of formally inviting students into Advanced Placement courses to see if they were more likely to enroll in these courses. These invitations are meant to give students a clearer understanding of the benefits of AP courses, as well as create a more welcoming environment for students who may be apprehensive about enrolling in AP courses. Additionally, this study examined the effect these invitations had on male students who historically are underrepresented in these courses.

Significance of the Study

Schools have many methods for motivating students to enroll in challenging courses like AP, such as having an open enrollment policy, paying students' exam fees, and providing weighted credit on the grades earned in these courses. One strategy that some schools attempt is to formally invite students to enroll in advanced courses with the hope of creating a more welcoming environment. Stroman (2019) suggests that one way to encourage enrollment in advanced courses like AP is for schools to create a more welcoming environment and reinforce confidence in students' academic achievement. This current study was conducted to explore the propensity of students to enroll in AP

courses after they had received a formal invitation into these courses. Furthermore, this study examined the effect these formal invitations had on male students, a group which is often underrepresented in AP courses. The school in which this research was conducted may be able to apply this study when deciding if they will use personal invitations to motivate students into taking these challenging classes, particularly those in Grade 10 who have the choice to enroll in multiple AP courses for the following year.

Delimitations

According to Lunenburg and Irby (2008), delimitations can be defined as "self-imposed boundaries set by the purpose and scope of the study" (p. 134). The following delimitations were identified for this study.

1. The location of this study was a large suburban school located in the Midwest.
2. Students' scores on the Scholastic Reading Inventory (SRI) test, Missouri's End-of-Course (EOC) exam, and students' grades in previous courses were used to determine if they were suitable candidates for a particular AP course.
3. Students selected were in Grade 10 who were enrolling in courses for Grade 11.
4. Students who had not taken SRI or EOC tests or were new to the district were excluded from this study.
5. Enrollment data were analyzed after the 2019-2020 enrollment period when formal invitations were administered. These data were compared to the 2017, 2018, and 2019 enrollment data when no formal invitations were administered.

Assumptions

Lunenburg and Irby (2008) defined assumptions as "postulates, premises, and propositions that are accepted as operational for purposes of the research" (p. 135). The following assumptions were identified for this study:

1. The SRI, EOC, and students' grades were suitable indicators to determine if students were qualified for AP courses.
2. Students' grades, SRI, and EOC scores were recorded accurately.
3. Students took the SRI, and EOC tests with fidelity.
4. The students' grades in previous courses accurately reflect their skills and knowledge in different subject areas.
5. Enrollment data from the 2016-2020 school years were accurate.

Research Questions

As defined by Lunenberg and Irby (2008), research questions "should flow directly from the preceding theoretical framework and identify questions that have not been addressed previously or remain unanswered in the literature" (p. 126). The purpose of this study was to examine the impact formal invitations had on motivating students to enroll in AP courses.

RQ1. To what extent do invitations into AP courses affect students' enrollment in AP courses?

RQ2. To what extent do invitations into AP courses affect male students' enrollment in AP courses?

Definition of Terms

To help ensure clarity, this section provides definitions of key terms as they are used throughout this study.

Advanced Placement. The AP program is a collection of 38 courses that are designed to deliver challenging academic work to high school students that aligns with college coursework (AP Central, 2018). Each of these AP courses concludes with an examination, referred to as an AP exam, that tests students' level of mastery in that coursework. Exams are scored on a 1 to 5 scale, and colleges that recognize AP scores typically will give college credit for a score of 3 or higher.

Algebra I End of Course (EOC) exam. Missouri's End of Course (EOC) exam is a state assessment that students take when nearing completion of the Algebra I course. Students' results are scaled scores that range in value from 100 to 250. The scores students earn on this exam determine their achievement level on Missouri Learning Standards for the Algebra I course. Students' performance is reported in four different achievement levels that describe their level of proficiency on these standards. Each of the exams has four levels of scoring that include Below Basic, Basic, Proficient, and Advanced.

Grade point average (GPA). GPA is the students' grade average based on a four-point scale with A=4.0, B=3.0, C=2.0, D=1.0, and F=0.0. A student's grades in all courses are calculated each semester and continue to be averaged together as a student progresses through each semester of high school.

Lexile Score. A Lexile score is the reading comprehension score received from taking the Scholastic Reading Inventory (SRI) exam.

Scholastic Reading Inventory exam. The Scholastic Reading Inventory (SRI) exam is a nationally normed reading comprehension test that provides data on students' reading level kindergarten through Grade 12 (Scholastic, Inc., 2014).

Student underrepresentation. Students in a demographic group not enrolling in particular courses at the same rate as students from other groups.

Organization of the Study

This study is organized into 5 chapters. Chapter 1 introduces the study, the background of the topic, statement of the problem, the purpose of the study, and the delimitations. Additionally, Chapter 1 includes the assumptions and definitions of the key terms found in the study. Chapter 2 provides a review of the literature involving the AP program including its history and benefits for students who enroll in AP courses. The review of literature in Chapter 2 also includes what motivates and prevents some students from enrolling in AP courses, as well as what criteria can be used to identify students who have the potential to be successful in AP courses. Chapter 3 explains the methodology of the study, how the research was designed, the population and sample, as well as how data were collected, and research questions were answered. Chapter 4 includes the methodology of the study and the results of the hypothesis testing. Chapter 5 includes a summary of the study, an interpretation of the results of the data analysis, a comparison of the results to what was found in the literature, a conclusion based on the results, and recommendations for further study.

Chapter 2

Review of Literature

History of Advanced Placement

Schneider (2009) describes how the Advanced Placement program was first developed in the early 1950s when the leaders of several elite private schools, including Phillips Academy Andover, Lawrenceville, and Exeter began considering major revisions to the curriculum at their schools. At the same time, Harvard, Yale, and Princeton Universities started working with the Ford Foundation to build a program that increased the level of rigor in high school courses to better prepare students for the academic challenges they would face at the college level (Schneider, 2009). Rothschild (1999) explained how these different institutions formed a partnership and began work on a high school program of studies intended for the very best and brightest students in elite American private schools. In 1953, seven schools in the United States began piloting Advanced Placement courses. The student selection process ranged from the use of IQ scores to teacher recommendations. These students were invited to enroll in these courses and letters were sent home to their parents explaining this newly implemented program (Rothschild, 1999). According to Rothschild (1999), AP courses remained isolated in elite private schools up until the early 1970s as the nation shifted to an academic philosophy that supported "better education for the many, rather than the best education for the few" (p. 185). According to Schneider (2009), the program expanded throughout the 1970s and 1980s into public schools, but ethnic diversity continued to languish, and the "typical AP student was likely to come from a large rather than small school and from a school with a minority enrollment of fifteen to forty-nine percent,

rather than fifty percent or more" (p. 821). According to Klopfenstein (2004), from 1990-2000, the AP program grew by 40%, which is attributed to more federal, state, and local funding for schools to adopt AP courses. Although the AP does not charge schools to offer courses and the AP exam fees are typically paid by the students who are testing, schools do have to pay to train teachers, purchase new textbooks, and create room in their course offerings for these new AP courses. Consequently, small schools in rural areas and impoverished urban schools are less likely to provide AP courses than large, suburban districts.

Because of a louder call in the 2000s for racial equality in school districts, a greater emphasis was placed on AP courses being offered in schools with large minority populations. Judson and Hobson (2015) stated that a higher number of minority students, particularly Hispanic students, began taking AP exams because of these initiatives, but white and Asian students still were much more likely to enroll in AP courses than black and Hispanic students. Furthermore, the stigma that AP courses are only for prestigious private schools or only for "gifted" white students has not decreased. In recent years, AP has worked to change this stigma and narrow the participation gaps that have remained for decades.

Success in AP courses

Due to the enormous growth of the AP program over the last twenty years, there has been increasing worry that the rigorous curriculum and expectations in AP courses have declined. Schneider (2009) argues that "as more college and university applicants submitted transcripts filled with AP courses, the credential value of AP was weakened and has become less influential in post-secondary admissions, at least among highly

selective schools" (p. 814). To support this claim, Schneider provides examples of some private schools removing their AP programs and a few highly selective universities no longer accepting AP for college credit.

Schools removing or limiting their courses, however, are the exception and not the rule. AP programs continue to flourish in public and private schools throughout the United States, and most colleges and universities continue to recognize high AP scores and offer students college credit for their achievement. According to Drew (2011), in order to maintain challenging and engaging coursework, as well as greater teacher accountability, the College Board issued curriculum standards in every AP course and now requires teachers to submit their syllabi to help ensure that these standards are in place.

Despite the criticism of too many students enrolling in AP courses, the College Board (2009) continues to support initiatives to motivate more students into taking AP courses and defends its position that students who take AP courses are better prepared for the challenges of college and are more likely to succeed in college. The College Board (2009) examined college students and found the following:

> AP students as a group consistently outperformed Non-AP students. Across the ten subject areas, students who had taken an AP Exam consistently took more hours in their first year, in the related subject area, and in college overall than did Non-AP students. They also consistently had higher GPAs in the subject area related to the AP Exam. (p. 9)

In their study of 9,075 students' performance in high school and college, researchers Scott, Tolson, and Lee (2010) came to similar conclusions as the College Board, finding

students who had taken AP courses in high school outperformed non-AP students when it came to academics, regardless of gender, ethnicity, or SAT scores. Using the National Educational Longitudinal Study (1988-2000) that studies students from their eighth-grade year through college, Stearns, Potochnick, Moller, and Southworth (2010) found that students, regardless of racial background, who took advanced courses in high school were more likely to be accepted and succeed at prestigious colleges than peers of the same racial background who did not take advanced courses. Because of these conclusions, the researchers recommended that schools seek out more students to enroll in AP courses and offer additional AP courses in other subject areas. Additionally, Chajewski, Mattern, and Shaw (2011) in their study of 1,523,546 students in 17,142 schools found that students who took at least one AP class while in high school were 171% more likely to enroll in a 4-year post-secondary institution than non-AP students. Based on this high percentage, the researchers concluded that taking AP courses can be one indicator of academic motivation, and they hypothesized that AP courses help students develop skills that build confidence in attending college and taking on academic challenges. Similarly, Woods, Park, Hu, and Bertrand-Jones (2018), in their study of 27,702 college students in the Florida College System, found that students who took a college preparatory math class in high school, like AP, had a 55% probability of passing their math course in college, while students who had not taken an advanced math course had a 47% probability of passing a math course in college. The College Board uses studies like these to promote the successes of the AP program and increase the number of students enrolling in AP courses.

Despite the College Board's many studies that point to AP courses providing the preparation necessary for success in college, other studies have come to less conclusive results. One concern, described by Klopfenstein and Thomas (2009), in drawing a firm correlation between enrollment in AP courses and later success in college is whether the students who take AP courses are already motivated and engaged in their education to the point that they already possessed a greater likelihood of being successful in college, regardless of the AP courses they took. Although they agree that AP students have a higher success rate in college, Klopfenstein and Thomas (2009) question the direct causality of AP enrollment being a high predictor of later college success for all students. Dougherty, Mellor, and Jian's (2006) study of longitudinal data across the state of Texas's education system echoes similar results, finding that students who came from schools that have a high student pass-rate average (3 or above) on AP exams were more likely than non-AP students to graduate from college in 2002. However, students who came from schools with a lower pass rate (more students earning 1s or 2s) perform at the same rate and are as likely to graduate from college as their non-AP peers. Based on these findings, Dougherty, Mellor, and Jian (2006) concluded that AP courses are not an automatic predictor of success, but rather the quality of preparation, teaching, and learning in these courses is the greater indicator of students' later academic achievement. Consequently, not every student may benefit from enrolling in an AP class, but students who are prepared for challenging coursework are more likely to do well in these courses and achieve greater success later in college.

Remedial Courses

On the other side of this issue of college readiness, students who are underprepared for high expectations of college-level work, struggle in college and often drop out before earning a diploma. According to the National Center for Education Statistics (NCES) (2016) in the 2011-12 school year, 29% of students who attended a 4-year institution and 41% of students at a 2-year institution took at least one remedial class while completing their postsecondary education. Furthermore, Methvin and Markham (2015) have reported that only 8% of community college students who had to take a remedial program completed a degree. These studies indicate that a large portion of high school students simply are unprepared for the challenges they face at postsecondary institutions. Many of these students are caught off guard by high expectations and workload they meet when initially walking on to that college campus.

Despite their lack of success in college, according to a 2008 survey conducted by the Strong American Schools Project of over one million students across the United States in different university systems, four out of five students who took remedial college courses reported having a 3.0 or higher grade point average in high school. Furthermore, 59% described their high school courses as being easy and wished that they had been more rigorous and engaging. Based on these findings, Strong American Schools (2008), recommends that high schools work to provide more challenging and engaging courses for their students and actively work to prepare students for the level of work they will see in college. Although that does not automatically mean AP courses, the curriculum and goals developed in AP courses are intended to be challenging and provide students a college-preparatory curriculum.

Race Participation Gaps

Regardless of the College Board's work over the last two decades and a range of efforts from school districts across the United States, certain demographics of the high school population remain overrepresented, while others remain underrepresented in AP courses. Part of this is due to some schools simply not offering these programs. Theokas and Saaris (2013) reported that nearly all large high schools across the United States offered at least one AP class, while less than half of the small schools in the United States offered AP. This may be due to the costs involved in a school district offering AP courses. According to the College Board (2018), when factoring in teacher training, textbooks, and materials, AP courses in language and history can cost as much as $5,000, and AP science courses can cost as much as $10,000 to begin. Small school districts often cannot extend their budgets far enough to afford these costs.

Unfortunately, participation gaps in AP courses are not only a matter of geography; despite the College Board's efforts to bring greater equity to the AP program, minority students are still widely underrepresented in AP courses. In the 2014 College Board report analyzing the previous year's testing session, a total of 1,003,340 students and 132,555 schools in the United States participated in AP testing. According to the report, African American students made up 14.5% of the total 2013 graduating class, but only made up 9.2% of the total number of students who participated in AP testing. Similarly, students identified as eligible for free or reduced lunch made up 48% of the total number of students graduating in the United States in 2013, but they only made up 27.5% of students who participated in AP exams.

Using GPA, grades, and PSAT scores, the College Board (2014), in its "The 10th Annual Report to the Nation" also reported that only three out of ten African American students who had the potential to be successful in AP science courses actually enrolled in one. In comparison, the same report, as shown in Table 1, reported that six out of ten Asian American students and four out of ten white students who had the potential to be successful in an AP science course enrolled in one.

Table 1

Percentage of Students with Potential to Succeed in AP Science courses Who Took the Class

Ethnicity	Percentage
Asian	60
White	40
Hispanic	40
African American	30

Note. Adapted from *The 10th Annual Report to the Nation* by the College Board, 2014

A study by the National Center of Education Statistics (2017) found similar racial disparities in the average number of AP and International Baccalaureate (IB) course credits earned by students nationwide during the 2013-14 school year and reported that Asian-American students averaged 4.3 credits of these advanced courses, white students averaged 3.1 credits, and African-American students earned an average of 2.7 credits.

According to Murphy and Dodd (2009), in their study of 24,939 students entering the University of Texas at Austin as first-year students from 1998-2001, those who took AP courses were more likely to be better prepared and outperformed non-AP students in

their college classes. Consequently, taking advanced courses like AP is to the benefit of high school students and makes the underrepresentation of specific demographics of the student population a distinct issue that requires action. In a qualitative study of fourteen African American students in the Detroit Metropolitan area and their perceptions of AP courses, Fluker (2018) found that many of the students were uninformed on the benefits of these courses and, therefore, considered them to be a waste of time and effort. Other students feared the level of challenge in these courses and wanted to avoid potential failure. Based on these findings, it is clear schools need to do more to communicate the benefits of courses like AP and provide students more encouragement and build self-confidence, so they will enroll in these courses.

Gender Participation Gaps

Education participation gaps involving race, especially for programs like AP, have garnered a great deal of attention in academic research, but one particular participation gap that has not received as much focus is the disparity between male and female students enrolled in advanced courses like AP. The exam data provided by the College Board (2018) and detailed in Table 2 show that of the total number of students who took AP exams, 44% were males and 56% were females. When examining the ten most popular courses and exams offered by AP in 2018, the gap widens further with 42% of testers being male and 58% female, the results are similar with 45% of tests taken by males and 55% of tests taken by female students (College Board 2018).

Table 2

Gender Distribution of Ten Most Popular AP Exams in 2018

AP Exams	Males	Females	Totals
Biology	98,098	161,565	259,663
Calculus AB	156,595	151,943	308,538
Language and Comp.	217,626	362,417	580,043
Literature and Comp.	149,428	254,586	404,014
Gov't and Politics: US	151,834	174,558	326,392
Human Geography	94,094	122,689	216,783
Psychology	106,357	205,402	311,759
Statistics	106,079	116,422	222,501
U.S. History	227,920	273,610	501,530
World History	133,295	169,948	303,243

Adapted from the "Program Summary Report 2018" by The Advanced Placement Program. Copyright 2018 by The College Board

Differences in participation rates in high school advanced courses mirror what is seen in participation rates in most other areas of study on college campuses. Goldin, Katz, and Kuziemko (2006) report that for every one male who graduated with a four-year degree in the United States in 2003, there were 1.35 females who did the same. In their examination of data from nearly 30,000 students in Canada, Looker, and Theissen (2004) found that girls averaged higher grades and had loftier educational aspirations than male students. In another study of over 231,377 white students and 23,028 African-American students from 1964-2002, Diprete and Buchmann (2006) found that the completion of college degrees for women 25- to 29-years old began to rise around 1981

and eventually overtook the number of male students of the same age completing college degrees around 1990. In examining the reasons for this rise, Diprete and Buchmann (2006) argued that the value of a college education is higher for females than males concerning higher wages, stronger financial stability for families, and increasing the likelihood of avoiding income deprivation. Due to these higher benefits, women view college more favorably and are more likely to attend and earn a degree.

Part of this growing gender gap may be due to differences in educational expectations for male and female students. In their analysis of the Educational Longitudinal Study data, which studied 14,713 students in the United States from their 10th grade year to their postsecondary education, workplace, or both, Wells, Seifert, Padgett, Park, and Umbach (2011) point to parents and peers as having a major impact on the educational outcomes of students. According to this study's findings, approximately 77% of female students have at least one parent who expected them to attend college, whereas 72% of male students had at least one parent with the same expectations. Additionally, this study concluded that the expectations of the parents with the same sex of a student had a greater impact, with mothers typically having a greater influence on their daughters and fathers having a greater influence on sons. Furthermore, Wells, et al. (2011) revealed that parental involvement appears to have a larger, more positive impact on females. Consequently, as more and more daughters over the last thirty to forty years have had mothers who went to college, and these mothers continue to encourage their daughters more successfully than their sons to follow a similar path as they did, a trend of more females attending and graduating from college perpetuates itself. Beyond the expectations of parents, Wells, et al. (2011) found even greater gender disparity between

peer networks and plans for college attendance. Their study found 54% of female high school students reported most or all of their friends planned to attend college while only 44% of male students reported the same. These differences in expectations between male and female students may not just have an impact on college attendance, but also on performance in school before these students begin even considering a path to college.

Gunzelmann and Connell (2006) explain that male students entering kindergarten typically are behind female kindergarteners in reading and writing skills as they are traditionally taught in elementary schools. Boys, according to Gunzelmann and Connell (2006) often learn better through non-traditional means such as the use of movement and visual-spatial skills, but these methods often are not used at the same level as methods that require students to sit and work individually. This gap in ability closes around the fourth grade, but by that point, some boys have become frustrated and discouraged in school, which creates a perpetual spiral of boys disassociating themselves with school, thereby widening the achievement gap between themselves and female students further as they progress into middle and high school. Coeyman (2001) supports these findings and suggests that schools, especially in elementary grade-levels, tend to focus on female interests and reward behaviors that girls are more likely to excel at such as sitting quietly, focusing on detail-oriented tasks, and working cooperatively in groups. Coeyman (2001) suggests that these negative associations with school early in childhood later manifestes itself as anti-intellectualism in many male high school students, which stands as a barrier to being interested and pursuing acceptance into college.

Other recent studies have begun to examine different, more inconspicuous ways in which the gap in students' academic success is demonstrable. In their examination of

two different longitudinal studies that tracked 5,909 and13,210 students and the time they spent on homework, Gershenson and Holt (2015) found that male students averaged an hour less on homework per week than female students. The researchers viewed this gap as particularly troubling because the time students spend on homework "indicates possession of certain skills and facilitates learning and the development of new skills" (Gershenson & Holt, p. 440). In a survey of 1,800 eighth grade and eleventh grade students about homework, Xu (2010) found not only that females tended to spend more time on homework but were also more likely to be motivated to do homework because they saw it as a way to bring about academic success and build strong study habits. These conclusions are further troubling for male students considering how necessary good study habits are for challenging courses in high school and college.

Even with the decline of male-dominated manufacturing jobs and an increase in demand for careers that require a college diploma, male students appear less motivated to see their education as a path to success and are willing to seek out other, non-academic avenues. Looker and Thiessen (2004) in studying the responses of 29,687 15-year-old students across Canada found that male students had a lower level of engagement in school and were more likely to drop out before graduation. Similarly, Murnane (2013), through the use of the United States Census Bureau and The Department of Education data, studied graduation rates between 1970 and 2010 and found that females, across racial demographics, graduated at a higher rate than males, and in the first decade of the twenty-first century, the gender gap in the graduation rate actually widened for all racial groups except for Hispanics. In examining the data of dropout rates just since 2000, the NCES (2018) found that dropout rates between 2000 and 2016 have declined with male

dropouts moving from 12% to 7.1% and females moving from 9.9% to 5.1%; however, a persistent gender gap of 2% remains between these two groups.

Another one of the many reasons for the gender gap in academics may be the perceptions of masculinity and femininity that are pervasive on high school campuses. Heyder and Kessels (2017) in their study of 210 ninth grade students found that male students put a higher value on effortless achievement and considered high effort and high academic achievement as being more closely associated with feminine attributes. Therefore, in the constant struggle in high school to be socially accepted, males may choose not to be seen as working diligently to avoid criticism from their peers.

Despite the research and data detailing and clarifying the gender gaps in schools, this issue is rarely acknowledged outside of those doing research for this topic. Part of this may be due to factors that disguise the issue and the problems that result because of this gap in academic success. These academic performance gaps can remain hidden due to other factors, such as the differences in class participation between male and female students. In their study of 243 undergraduate students who tracked their participation in classrooms, such as asking and answering questions, Leraas, Kippen, and Larson (2018) found that male students were more likely to participate in the classroom and felt more comfortable participating than females. Alber (2017) found the same to be true in high school and middle school classrooms, where male students received more attention than female students. The focus teachers give comes in the form of calling on male students, acknowledging male students by name, and reprimanding male students more often. Consequently, female students often are relegated to a secondary role in the classroom due to the higher amounts of positive and negative attention teachers give to male

students. Furthermore, female students, according to Inzlicht and Ben-Zeev (2003) can feel intimidated and downplay their abilities in classrooms and many choose not to enroll in particular courses because of a lack of confidence.

This is especially true in courses that are within the traditional Science, Technology, Engineering, and Math (STEM) fields, which remain overrepresented by male students and underrepresented by female students. The National Center for Education Statistics (2015) studied gender disparities in interest level in STEM fields, credits earned in STEM-related courses, and performance on the National Assessment of Educational Progress (NAEP) mathematics and science assessments in 2009. The research revealed higher levels of interest in a STEM field by male students as compared to female students. Additionally, male students scored higher in 2009 on the NAEP mathematics and science assessments.

This trend continues on college campuses, where males are overrepresented in STEM degrees. During its study of associates, bachelors, graduate, and doctoral degrees awarded to students in the United States between 2009 and 2016, The National Center for Education Statistics (2018) reported much higher numbers of male students earning STEM degrees at each level compared to females. This trend continues into the world of work where women are continually underrepresented in STEM careers. For example, in a report for the American Society of Mechanical Engineers, Crawford (2012) found that only 14% of engineering jobs are held by women. Similar participation rates were found by Wang and Degol (2016) in their analysis of bachelor's degrees earned in 2012 and reported that women earned 43% of mathematics and statistics degrees, 18% of degrees

in computer and information sciences, 19% of degrees in engineering, and 38% of degrees in the physical and technological sciences.

Wang and Degol (2016) researched different explanations for these persistent gender disparities in STEM fields and found the greatest correlation in cultural stereotypes that subtly discourage female participation while stimulating boys' interests in STEM topics early in childhood. To combat these stereotypes, many researchers argue that more welcoming environments must be created to create greater parity in STEM fields (Wang & Degol, 2016; Bach, 2016; Martin 2016).

In the United States, there is wide recognition of the gender gaps in STEM fields, and over the last several years different programs have been introduced to engage female students' interest in these fields. According to Reinking and Martin (2018), organizations like Girls Inc. and websites like Engineer Girl work to expose girls to STEM subjects early in their lives with the hope that they continue to cultivate these interests throughout their schooling and later in careers. Despite these efforts, disparities remain between male and female students in STEM fields, including AP courses. Although females are overrepresented in AP courses overall, males still participate in most math and science AP courses at higher numbers than females as shown in the College Board's 2018 Summary Report detailed in Table 3.

Table 3

Gender Distribution in STEM AP Courses in 2018

AP Exams	Males	Females	Totals
Biology	98,098	161,565	259,663
Calculus AB	156,595	151,943	308,538
Calculus BC	80,332	59,044	139,376
Chemistry	80,263	81,589	161,852
Computer Science A	49,416	15,717	65,133
Computer Principles	49,466	22,721	72,187
Physics	41,210	16,189	57,399
Statistics	106,079	116,422	222,501

Adapted from the "Program Summary Report 2018" by The Advanced Placement Program. Copyright 2018 by The College Board

As shown, the one science subject that female students participate in at higher numbers is the AP Biology course. This anomaly in gender participation is not exclusive to the AP program. Eddy, Brownell, and Wenderoth (2014) report that 60% of undergraduate biology majors and approximately 50% of graduate degrees in biosciences are female. Education leaders and researchers are now exploring reasons why female students are making gains in these fields of scientific study, while they lag in others.

Strategies Employed

One reason why students of both genders may avoid AP courses is the stigma that remains about AP, which is the belief that only the most advanced or "gifted" students participate in AP. Parent and peer encouragement have been found to have the greatest impact on motivating students to take advanced classwork despite the additional

challenges and work involved (Looper & Thiessen, 2004; Well, et.al., 2011). Unfortunately, schools cannot create policies to get parents and friends to encourage students to take challenging coursework like AP, but schools are not powerless in getting capable students to enroll in courses that best suit them. To combat the misconception that AP courses are only for "gifted" students, Wakelyn (2009) reports that some schools attempt to recruit students in groups, so they do not feel isolated. Other schools, according to Wakelyn (2009), get students who are active in sports and take AP courses to speak to potential AP students and talk about their benefits. In a study of a large urban high school in North Carolina that counseled middle and high school students into AP courses, Potter and Morgan (2000) found students to be more motivated to register for AP courses.

Other schools pay students' AP exam fees to provide a monetary incentive for students to take AP exams. Cirillo (2010) studied the effects of 194 high schools in Virginia paying for students' exam fees and found that there was little change in the rate of students enrolling in AP courses in the first three years that a school offered this incentive compared to other schools who did not offer the incentive. However, schools that continued to pay students' exam fees for four years or more showed a higher percentage of students enrolling in AP courses compared to schools who did not pay student exams. Unfortunately, the cost of paying for all of these exams can become expensive and is simply not feasible for many school districts.

Teacher motivation to enroll more students into AP courses can remain low at times. The College Board (2002) reported that teachers often do not see the recruitment of students for AP courses to be a part of their role within schools. Teachers may be even

more reticent to recruit students who are a part of underrepresented groups into these courses because the teachers themselves do not see them as having the potential to succeed in these courses. However, teachers serving as mentors can have a positive impact on student enrollment in courses, especially when motivating underrepresented students to enroll in academically challenging courses. In examining consistent underperformance of African American students across the United States, Palmer, Davis, Moore, and Hilton (2010) recommended that teachers encourage students of color to take courses that challenge them, so they can achieve a higher likelihood of matriculating to and graduating from college.

Student Preparation for AP courses

High schools often struggle with what data to use to determine which students are prepared for the challenging coursework in AP courses. During enrollment for the following year's courses, sophomore students and their parents often consider and inquire about advanced courses like AP, IB, and dual-credit courses but are not provided hard evidence to decide on the best courses to select based on their academic results up to that point. According to Dougherty and Mellor (2009), students must have adequate preparation in middle school in order to be successful in AP courses later in high school. Putting students into courses they are not prepared for does not set them up for success, and they are more likely to become frustrated in the class and score low on the AP exams if these students take the exams at all.

However, Shepherd (1997) in a study of 460 students who enrolled in AP Biology between 1993 and 1996 found that variables such as school attendance, class rank, grade point average, SAT score, and the number of AP exams previously taken were strong

predictors of students' potential success in AP Biology. Based on the findings in the study, Shepherd (1997) hypothesized that these key variables revealed that students who were more serious about their academics were more likely to be successful in AP courses. However, the researcher does warn that other variables such as workload, test anxiety, socioeconomic factors, and the quality of the teacher could have a pronounced effect on an individual student's success. In their study of over one million students in the United States who took the Preliminary Scholastic Aptitude Test (PSAT) in the 10th and 11th grade and who took at least one AP exam during high school, Ewing, Camara, and Millsap (2006) determined that the PSAT was one of the best tools to use to predict success on AP exams. However, they also make the point that the PSAT scores should not be the only determining factor in admitting students into AP programs or attempting to discern whether students can be successful in AP courses. Unfortunately, schools too often use only one or two of these predictors to determine which students will be allowed to take AP courses and ignore other factors when considering acceptance.

Another indicator of education success that can be used to determine the potential of a student to succeed in AP courses is student attendance rate. The state of Oregon's Department of Education (2015) conducted a research study into students' daily attendance rate and compared that to students' graduation rate. The results showed that those students who had a 90% attendance rate or higher had a graduation rate of 91%, while students whose attendance rate was under 90% had a graduation rate at 75%. In a longitudinal study of approximately 86,000 elementary and middle school students in the Philadelphia School District from 1994 to 2001, Gottfried (2010) found that a high rate of school attendance correlated with a higher GPA and that the attendance rate appeared to

be more significant at upper grade levels. Goodman (2014), studying student attendance rate and achievement data from the Massachusetts Department of Education from 2003-2010, found that absenteeism had an overall negative effect on student success and academic performance. In a study of 444 Economics students in their second and third years of college, Arulampalam, Naylor, and Smith (2006) found that attending classes closely associated with academic success. Their findings also suggested that students with higher performance records in school were more productive when class was in session, and they may actually face a higher negative impact when absent than their lower-performing peers. Beyond general school achievement, there has not been a great deal of research into the link between attendance and success in programs like AP, but in a study of 460 students who enrolled in AP Biology between 1993 and 1996, Shepherd (1997) found a correlation between students' rate of attendance and the score they earned on the AP Biology exam. As the number of days students missed increased, their scores on the AP exam typically decreased. In examining 64,064 fourth-graders throughout New York City's elementary schools, Musser (2011) found a strong correlation between absenteeism and academic performance as well but noted that attendance rates are only one factor and not the exclusive determiner of students' academic success. Each of these researchers note that attendance alone was most likely not the determining factor in students' scores, but it is one data point that can help to reveal the seriousness of students towards their education, which culminates with other variables to affect the chances of students scoring well on AP exams.

One of these additional factors may be students' reading comprehension ability, which can be measured by a Lexile score earned on reading tests such as the Scholastic

Reading Inventory (SRI) test. According to a summary report from Scholastic, Inc. (2007) which produces the test, the SRI "is a computer-adaptive assessment designed to measure how well students read literature and expository texts of varying difficulties" (p. 1). The questions on the SRI are not fixed so that every student answers the same questions but vary based on the correct and incorrect responses students give. Districts who use the SRI test have students as early as kindergarten up through Grade 11 or 12 continue to take the SRI exam twice a year, once at the beginning of the year and then at the end of the year, to track students' growth in reading comprehension (Scholastic, Inc., 2007).

Examining the results of the National Longitudinal Survey of Youth (1979), which tracked 3,975 children born between 1979 and 1988 up into adulthood, Hernandez (2012) found that 16% of students who were not reading proficiently in the third grade were four times more likely to drop out of high school compared to proficient readers. Hernandez (2012) found that when socioeconomic status was factored into reading proficiency and graduation rates, 35% of students who lived in poverty and were not proficient readers by third grade did not graduate from high school. In a meta-analysis of six longitudinal surveys, Duncan, et al. (2007) found language and reading skills in elementary school was a consistent predictor of success later in high school. Similarly, in comparing the amount of engaged reading time students completed and their scores on the NAEP test, Guthrie, Schafer, and Huang (2001) found that students who read independently, checked out books from the library, and read for significant amounts of time based on their grade level scored at higher rates on the NAEP test than students with lower reading engagement.

Unfortunately, according to the ACT's report on "The Condition of College and Career Readiness" (2018) for U.S. students in the graduating class of 2018, only 46% of students who took the ACT met the college readiness benchmark in reading. Similarly, in examining the 2017 Nation's Report Card on the National Assessment of Educational Progress (NAEP) only 37% of twelfth-grade high school students across the nation scored at or above Proficient in Reading.

Grade Point Average

One of the most historically popular indicators of academic success is student grade point average (GPA); however, its reliability in identifying current student performance and predicting later success has been called into question. Colleges and universities typically require prospective students to submit their GPA as evidence of their academic achievement in high school, along with their class rank, and ACT or SAT scores. A number of studies funded by ACT, Inc. question the reliability and validity of GPA because of extraneous factors that potentially can affect students' grades (ACT, Inc, 2005; Westrick, Le, Robbins, Radunzel, & Schmidt, 2015; Zhang & Sanchez, 2013). Such factors as weighted credit, student behavior, and overall teacher bias can affect grades and their accuracy to represent the academic achievement level a student has attained. In a large meta-analysis that examined over eight million students' GPA and ACT scores from 1991 to 2003, Westrick, et al. (2015) found grades to be inflated beyond students' academic ability as compared to their ACT scores. In examining the data further, the results from this study show that GPA was higher than ACT, but consistently paralleled students' ACT scores.

Other studies have found different results and point to data that would indicate GPA to be a more accurate predictor of college success than ACT or SAT exam scores. In their study of 80,000 students who attended the University of California students, Geiser and Santelices (2007) found a higher degree of validity in GPA than standardized tests scores like the ACT and SAT. Their study found a strong correlation in scores on standardized tests and measures of socioeconomic status (SES) like parents' education level and family income (Geiser & Santelices, 2007). However, in using the same measures of SES, Geiser and Santelices (2007) only found a weak correlation between them and students' high school GPA. Furthermore, in tracking students throughout college, Geiser and Santelices's (2007) study found students' high school GPA to be a better predictor of students earning an undergraduate degree than standardized testing. In a similar study of 17,940 freshmen students who attended the University of Alaska from 2008 to 2012, Hodara and Lewis (2017) also found students' high school GPA to be a better indicator of college-readiness than standardized tests.

Summary

In Chapter 2 the relevant literature on motivating students to take advanced coursework like AP courses in high school is identified and reviewed. The chapter begins with a history of the AP program, describing its beginnings and its tremendous growth over the last seventy years. The second section explored the ways that AP courses benefit students, such as providing them the opportunity to earn college credit and prepare them for the academic challenges of college. The third section examined the need to create more opportunities to motivate students to take AP courses. A high number of students are not reaching college-readiness during high school, which means

they have to take remedial courses upon entering colleges, making their education more expensive and time-consuming. Furthermore, students who are underprepared for college are less likely to remain and earn a college degree. By taking challenging courses like AP, students are more likely to be prepared and successful in college. Despite many efforts over the last several decades, however, there are some demographic groups of students who are underrepresented in AP courses. The fifth section identifies particular groups such as African Americans and male students who enroll in AP courses at the same rate as others. The sixth section explores different strategies that school districts have used to motivate students to take AP courses. The last section then identifies student data points schools can use to identify students who have the potential to be successful in AP courses. Chapter 3 provides an overview of the methodology used in this study.

Chapter 3

Methods

The purpose of this quantitative, quasi-experimental study was to examine the effects that invitations into AP courses had on enrollment into those courses and if students who received an invitation were more likely to enroll in the courses than those who did not receive an invitation. Additionally, this study examined whether a specific demographic group (i.e. male students) was more likely to enroll in an AP class with an invitation. The purpose of this chapter is to explain the methodology used to make these comparisons, how the research was designed, and the process by which participants were selected. Additionally, the chapter explains how the data were analyzed, how the hypotheses were tested, and the limitations of the study.

Research Design

To study the extent to which invitations affected student enrollment in AP courses, a quantitative, quasi-experimental design was selected. This research design was selected because it allowed the researcher to study the possible causal impact that these invitations had on student enrollment into AP courses without a randomized sample. The enrollment data after the invitation were compared to previous years' enrollment data of Grade 10 students who met the same criteria but did not receive invitations to see if there was a relationship between being invited to enroll in AP courses and actually enrolling in those courses. The independent variable, which was categorical, was the invitation status of students, whether they had been invited to enroll in AP courses or not invited to enroll. The dependent variable, which was also categorical, was the enrollment status of students, whether they did enroll in AP courses or did not enroll.

Selection of Participants

The target population of this study are Grade 10 students who were identified as being capable of succeeding in AP courses in the Midwest of the United States. The participants who were selected to be invited to enroll in AP courses were based on the following criteria: they needed to be in Grade 10 during the year that they were enrolling with a 3.00 GPA, a daily attendance rate of 95% or higher, a Lexile score of 1100 or higher, and a score of Proficient or Advanced on the End of Course exam in Algebra I. The archived student data used for this study came from a medium-sized suburban school district in the Midwest of the United States. The school district has one high school that has approximately 1,800 students enrolled. As the experiment group, a total of 176 students were identified to be invited to enroll in AP courses. Additionally, as the control group, this study used the high school's student data from the 2016-2017, 2017-2018, and 2018-2019 school years to identify Grade 10 students who had the potential to be successful in AP courses, using the same criteria described above. A total of 463 students were identified as having the potential to succeed in AP courses in these previous years. Table 4 provides total enrollment numbers of students identified.

Table 4

Students Identified as Having the Potential to Succeed in AP courses Separated by Gender

Students Identified	2016-17	2017-18	2018-19	2019-20
Total	163	160	137	176
Females	95	100	70	102
Males	68	60	67	74

More specifically, the following criteria were used to identify students as having the potential for success in AP courses:

GPA. Cumulative GPA is measured on a four-point scale with A = 4.0, B = 3.0, C = 2.0, D = 1.0, and F = 0.0. A student's grades in all courses are calculated each semester and continue to be averaged together as a student progresses through each semester of high school. The school district from which the students were studied added additional "weight" to grades in advanced courses, but for the purpose of this study, students' non-weighted credit was examined. Students needed to have earned a 3.0 cumulative GPA or higher to be selected as having the potential to be successful in AP courses.

Lexile score. The Scholastic Reading Inventory (SRI) is a nationally normed reading comprehension test that provides data on students' reading level kindergarten through Grade 12, also termed a Lexile score (Scholastic, Inc., 2014). The SRI uses a scale that starts with "Beginning Reader" level at 100L and continues up to 2000L. Different levels or mark bands are assigned to each grade level to help determine students' progress and achievement. Students who are able to score within the 1185L to 1385L in Grades 11 and 12 are considered to have reached college-readiness in regard to

reading comprehension. Students needed to have earned an 1100 Lexile score or higher to be selected as having the potential to be successful in AP courses.

Daily attendance. Students' daily attendance is calculated as a ratio of the number of hours students have attended school and the total number of hours available in the school year. The daily attendance used in this study was the percentage of hours students had been in attendance for the first semester of their tenth-grade year. Students needed to have a 95% daily attendance rate or higher to be selected as having the potential to be successful in AP courses.

End of course exam scores: Algebra I. Missouri's End of Course (EOC) exam is assessed on a scaled score that ranges in value from 100 to 250. The scores students earn on this exam determine their achievement level on Missouri Learning Standards for the Algebra I course. Students' performance is then reported in four different achievement levels that describe their level of proficiency on these standards. Each of the exams has four levels of scoring that include Below Basic, Basic, Proficient, and Advanced. For the Algebra I EOC exam, used in this study, the score ranges for each performance level are as follows: Below Basic (100 to 186), Basic (187 to 199), Proficient (200 to 224), and Advanced (225 to 250). Students needed to have scored at the Proficient or Advanced level on the Algebra I EOC exam to be selected as having the potential to be successful in AP courses.

Measurement

Invitation status of students. The independent variable for RQ1 was the invitation status of students and whether they had been invited to enroll in AP courses or not. Using the criteria described above, the school district identified students who had the potential to be successful in AP courses just before the 2019-2020 school year enrollment period and invited them to enroll in these courses for the following year, and these students were subsequently given the status of "Invited." Using the same criteria, students from the 2016-2017, 2017-2018, 2018-2019 were identified as having the potential to succeed in AP courses, but these students did not receive an invitation, and these students were given the status "Not Invited" for RQ1.

Gender. For RQ2, the independent variable was the invitation status of male students. Using Tyler's Student Information System (SIS), the school district's information system, students' gender was identified as reported by the students or their parents, typically during enrollment into the school district. Male students were then recorded as "M" and female students were recorded as "F" for the study. This format for reporting and recording of gender was used consistently for all the years that data were used.

Enrollment status of students in AP courses. The dependent variable for this study was whether the students identified as having the potential to succeed in AP courses enrolled in AP courses or not. Students who did enroll in at least one AP course were given the status "Enrolled" while those who did not enroll in an AP course were given the status "Not Enrolled."

Data Collection Procedures

All of the data used in this study had previously been archived by the school district. Before collecting data and conducting the study, the researcher gained approval from the school district's Assistant Superintendent of Educational Services (see Appendix A). After reviewing the request, the assistant superintendent approved the request. (See Appendix A). Baker University Institutional Review Board approved the study on March 30, 2020 (See Appendix B).

GPA, EOC exam scores, daily attendance rates, SRI scores, and student participation in extracurricular activities had been collected previously for the students' scorecards through the district's information management system, Tyler Student Information System (SIS). District staff then created an Excel spreadsheet to build student scorecards containing students' GPA, SRI scores, EOC scores, and daily attendance. These data were used to identify students who had the potential for success in AP courses. For this study, the researcher requested and was given access to the student scorecard data.

After identifying all the students based on the established criteria, direction was received from district leadership to meet with students who were identified and invite them to enroll in AP courses for the 2019-2020 school year. The researcher of this study conducted all these meetings as a district employee and worked to keep the content and format of each meeting consistent to better ensure that the data were accurate and trustworthy. The meeting protocol included five parts: 1) a personal introduction and explanation for why the student was called out of class; 2) a review of the student's academic record; 3) a description of AP classes and reasons for why students should

enroll in these classes; 4) a personal invitation into these classes; 5) and then time to answer the student's questions. At the beginning of the meeting, the researcher introduced himself to the student and explained his role and the purpose for calling the student out of class to establish his credibility. The researcher then reviewed the student's academic record with the student. During the next part of the meeting, the researcher provided details about AP courses and the exam students took at the end of the course. A description of the benefits of taking AP courses was then provided, which included the potential to earn college credit, working with high-quality teachers, and the opportunity to sharpen skills such as research, critical thinking, and time management. Information was then given about the fees for AP exams and the availability of district scholarships to pay these fees for students with financial needs. The researcher then moved to the next part of the meeting and invited each student to enroll in AP courses for the 2019-2020 school year. Finally, the researcher answered any questions students had regarding AP classes and other course options. The meetings were conducted in the researcher's office at the high school and lasted for approximately five to seven minutes. Although AP courses were promoted positively and students were encouraged to enroll in these courses, the researcher avoided speaking about personal beliefs and worked to provide an unbiased description of these courses and the potential benefits of enrolling in them. The researcher worked to ensure that students enrolled in AP based on the merits of these courses.

Later as the researcher of this study, archived data of students who received invitations were used and these students' enrollment information was tracked to determine if they did or did not enroll in AP courses. Students' data from the 2016-2017,

2017-2018, and 2018-2019 school years were retrieved using SIS and students in Grade 10 were identified in each school year who fit the established criteria for success in AP courses. The enrollment data were then examined to determine whether these students did or did not enroll in AP courses for their eleventh-grade year. Additionally, SIS was utilized to record students' gender so that male students could be identified and their enrollment in AP courses could be examined. An Excel spreadsheet was created containing the lists of identified students and whether they enrolled in AP courses or not. These data were imported into the IBM SPSS Statistics GradPack 25 and stored by the researcher on a password protected computer.

Data Analysis and Hypothesis Testing

RQ1. To what extent do invitations into AP courses affect students' enrollment in AP courses?

***H1*.** Invitations did have an impact on students' propensity to enroll in AP courses.

A chi-squared test of independence was conducted to address RQ1 because the relationship between two categorical variables was analyzed. A 2 x 2 frequency table was constructed for the two categorical variables: invitation status (Variable 1) and enrollment status in AP courses (Variable 2). The observed frequencies were compared to those expected by chance. The level of significance was set at .05. An effect size is reported, when appropriate.

RQ2. To what extent do invitations into AP courses affect male students' enrollment in AP courses?

H2. Invitations did have an impact on male students' propensity to enroll in AP courses.

A chi-squared test of independence was conducted to address RQ2 because the relationship between two categorical variables was analyzed. A 2 x 2 frequency table was constructed for the two categorical variables: invitation status of male students (Variable 1) and enrollment status of male students in AP courses (Variable 2). The observed frequencies were compared to those expected by chance. The level of significance was set at .05. An effect size is reported, when appropriate.

Limitations

Lunenburg and Irby (2008) define the limitations of a study as factors that are not controlled by the researcher "that may have an effect on the interpretations of the findings or on the generalizability of the results" (p. 133). The limitations of this study are as follows:

1. The sample of students are from one high school and may not be generalizable to all schools.
2. The sample of students in the study contained a small number of students, thereby limiting understanding of the impact invitations may have on the enrollment in AP courses in general.
3. The criteria used by the school district to identify students may have been too restricting, thereby excluding students from receiving invitations who may have had the potential to be successful in AP courses.

Summary

In this chapter, the goals for the research were delineated. The design of the research was described along with an explanation for how the participants in the archived data sample were selected based on criteria set by the district from which data were gathered from this study. Additionally, explanations of the measurements were provided. Following this information, the research questions and hypotheses were listed along with descriptions of the statistical tests used to answer the research questions and test the hypotheses. The limitations of the research study were also provided in this chapter. The results of the statistical analysis are explained in Chapter 4.

Chapter 4

Results

The purpose of this quantitative, quasi-experimental study was to examine the effects that invitations into AP courses had on enrollment into those courses. Additionally, this study examined whether male students were more likely to enroll in an AP class with an invitation. Chapter 4 presents the descriptive statistics and analysis results of the hypothesis testing for the two research questions.

Descriptive Statistics

The population for this study consisted of Grade 10 students in the 2016-2017, 2017-2018, 2018-2019, and 2019-2020 school years who were identified as having the potential to succeed in an AP course in a high school in the Midwestern part of the United States. A total of 637 students were identified over the four-year period; 367 of these students were female and 270 students were male; 174 students received an invitation to enroll and 463 of them did not.

The following section contains the results of the hypothesis testing.

Hypothesis Testing

RQ1. To what extent do invitations into AP courses affect students' enrollment in AP courses?

H1. Invitations did have an impact on students' propensity to enroll in AP courses.

The results of the chi-square test of independence did not indicate a statistically significant difference between the observed and expected frequencies $X^2(1) = .745$, $p = .388$. See Table 5 for the observed and expected frequencies. The results of the chi-

square test of independence showed that formally inviting students to enroll in AP courses was not related to enrollment into these courses. The research hypothesis was not supported.

Table 5

Observed and Expected Frequencies for RQ1

Invitation Status		Not enrolled	Enrolled
Non-invite	Observed	133	330
	Expected	128.7	334.3
Invite	Observed	44	130
	Expected	48.3	125.7

RQ2. To what extent do invitations into AP courses affect male students' enrollment in AP courses?

H2. Invitations did have an impact on male students' propensity to enroll in AP courses.

The results of the chi-square test of independence did not indicate a statistically significant difference between the observed and expected frequencies $X^2(1) = .014$, $p = .905$. See Table 6 for the observed and expected frequencies. The results of the chi-square test of independence showed that formally inviting male students to enroll in AP courses was not related to their enrollment into these courses. The research hypothesis was not supported.

Table 6

Observed and Expected Frequencies for RQ2

Invitation Status		Not enrolled	Enrolled
Non-invite	Observed	62	136
	Expected	61.6	136.4
Invite	Observed	22	50
	Expected	22.4	49.6

Summary

This chapter presented the results of the study. The results of the hypothesis test RQ1 indicated that there was not a relationship between students being invited to enroll in AP courses and the enrollment of these students in AP courses. The result was consistent when it was narrowed to just male students, and it showed that there was not a relationship between male students being invited to enroll in AP courses and their enrollment in AP courses. Chapter 5 presents a summary of the study, research findings, how the findings related to the literature, implications for actions, and recommendations for further research.

Chapter 5

Interpretation and Recommendations

Study Summary

According to Scott, Tolsen, and Lee (2010), students who took AP courses in high school averaged a higher GPA in college than students who did not take AP courses. Similarly, McCauley (2007) found that students who took AP courses in high school have a greater likelihood of graduating with an undergraduate degree compared with non-AP students. Consequently, high schools have an incentive to encourage students who have the potential to be successful in advanced courses to enroll in them.

The purpose of this quantitative, quasi-experimental study was to examine the propensity of students to enroll in AP courses upon receiving an invitation into these courses. Additionally, an analysis was conducted on the effect these invitations had on male students who often are underrepresented in AP courses. A statistical analysis was conducted to determine if there was a relationship between personal invitations into AP courses and enrollment in these courses. Data were evaluated for Grade 10 students who had been identified as having the potential to be successful in AP courses and received personal invitations into AP courses. Data also were evaluated on Grade 10 students from previous years who were identified as having the potential to be successful in AP courses but did receive a personal invitation to enroll in the courses. Through chi-square tests of independence, this study concluded that inviting potentially successful students to enroll in AP courses is not a successful strategy, and schools need to look for other approaches to increase student enrollment in advanced courses like AP and reduce participation gaps in student groups that are underrepresented in these courses.

This chapter includes a summary of the study and an overview of the problem. Additionally, the chapter provides the study's purpose statement and research questions, a review of the methodology, major findings, implications for action, and recommendations for further research.

Overview of the problem. The College Board (2015) and some groups such as Hanover Research (2015) encourage schools to take direct action in enrolling students for AP courses by creating a more welcoming environment, so students see these courses to be as much for them as other students. Unfortunately, most studies only focus on the different ways students are discouraged from taking advanced courses (College Board, 2002; Fluker, 2018; Wang & Degol, 2016). The College Board (2015) recommends that schools meet with students to discuss their academic achievements and invite them to enroll in AP courses, and Stroman (2019) reports that creating a welcoming environment and reinforcing confidence in students' academic achievement successfully motivates students to enroll in these courses. Unfortunately, these sources provide little in the way of hard evidence on whether creating a welcoming environment through personal invitations is a successful strategy in motivating students to enroll in advanced courses like AP.

Purpose statement and research questions. The purpose of this quantitative, quasi-experimental study was to examine the effect that personal invitations into AP courses had on student enrollment in these courses. Additionally, an analysis was conducted on the effect these personal invitations had on male students who are often underrepresented in AP courses. The following research questions were developed for this study's purposes:

RQ1. To what extent do invitations into AP courses affect students' enrollment in AP courses?

RQ2. To what extent do invitations into AP courses affect male students' enrollment in AP courses?

Review of the methodology. The researcher used a quantitative, quasi-experimental approach to examine the effect of formally inviting students to enroll in AP courses. This approach allowed the researcher to compare the data of students identified as having the potential to be successful in AP courses and who received a personal invitation to enroll in AP courses with those students who were identified in previous years as having the potential to be successful in AP courses but did not receive a personal invitation. Additionally, the researcher examined the data further to study the effects these personal invitations had on male students who are often underrepresented in advanced courses like AP.

Students were identified as having the potential to be successful in AP courses through specific criteria that included GPA, daily-attendance, Algebra I EOC scores, and SRI reading comprehension scores. Prior to the 2018-2019 course enrollment period, each of the identified Grade 10 students met with a member of the high school faculty who explained what AP courses are, the benefits of taking advanced courses, and then encouraged the student to enroll in AP courses for the following year. Archived data from the enrollment period were then tracked to determine who enrolled in AP courses and who did not. These results were then compared with enrollment data from the 2015-2016, 2016-2017, 2017-2018 enrollment periods when no formal invitations were given. The researcher identified Grade 10 students during each of those years who met the same

criteria for having the potential to be successful in AP courses. The enrollment data were then examined to determine who had enrolled in AP courses for the following year to study the propensity of students to enroll in AP courses without a formal invitation.

A chi-square test of independence was conducted to examine the effects these formal invitations had on student enrollment in AP courses and determine if there was a relationship in Grade 10 students receiving an invitation and enrolling in at least one AP course. A chi-square test of independence also was conducted to determine if there was a relationship in male students receiving an invitation and their enrollment in AP courses.

Major findings. This study found that inviting students to enroll in AP courses for the upcoming school year did not affect students' enrollment into these courses. Likewise, for male students who often are underrepresented in advanced courses like AP, this study concluded that personal invitations did not have an impact on their enrollment into these courses. Students who did not receive invitations enrolled in AP courses at nearly the same rate as students who did receive invitations. Consequently, the major finding in this study is that invitations are not a successful strategy in increasing enrollment in AP courses or closing the participation gap often found in advanced courses like AP.

Findings Related to the Literature

As described by Klopfenstein (2004), the number of schools in the United States that offer AP courses and the number of students who enroll in AP courses and sit for the exams have risen dramatically in the last twenty years. However, when exploring the exam data from the College Board (2018), participation gaps in AP courses continue to be an issue. In examining AP exam data published by the College Board (2018) male

students, regardless of race, sit for most AP exams at a dramatically lesser rate than their female counterparts. This was found to be true in the school where this study was conducted with a 14% participation gap between male and female students enrolled in AP courses.

The literature reviewed for this study identified an array of reasons that may have factored into the results of this current study. Wakelyn (2009) reports that students often viewed AP courses to be only for "gifted" students and lacked the confidence to enroll in these courses. Taliaferro and Decuir-Gunby (2008) suggest that parents' perceptions, expectations, and advocacy have a major impact on whether their students enroll in advanced courses like AP or not. Unfortunately, these parental expectations for students may be contributing to the participation gaps in AP courses. Wells, et al. (2011) report that the parents in their study often had a higher expectation for female children to attend college as compared to male children. Consequently, these female students would be more motivated to enroll in AP courses as compared to males, and a one-time meeting and personal invitation might not have been enough to have a measurable effect on parents' expectations and students' academic plans.

These differences in academic expectations also extend to students' peers. Wells, et al. (2011) found disparities based on gender between peer networks and plans for college attendance. Their study found that 54% of female high school students stated that most or all of their friends were planning to attend college, while only 44% of male students reported the same. Because AP courses are designed to prepare students for the rigorous coursework they will find in college, it stands to reason that female students, with these higher expectations for college attendance, would seek these courses out at

higher rates as reported in this study. Additionally, Kiuru, et al. (2007) in a quantitative study of 394 ninth graders in Finland found that students, regardless of gender, shared peer groups with students who had similar educational expectations as themselves. Based on these findings, the researchers surmised that peers act as informal advisors and have a significant impact on the academic choices that high school students make. The implications for this current study may be that peers had a stronger influence than the school faculty member who conducted the meetings. Students in peer groups containing others who did not plan to enroll in AP courses may have already decided not to enroll in AP courses based on what their peers were taking and did not change their plans, despite new information and encouragement from an adult to enroll in AP courses.

Differences in expectations between male and female students may also have an impact on academic performance long before these students begin considering what courses to take in high school. Gunzelmann and Connell (2006) explained that male students entering kindergarten typically are behind female kindergarteners in reading and writing skills, especially when teachers use traditional methods of teaching these skills. This gap in ability closes around the fourth grade, but by that point, some boys have become frustrated and discouraged in school, creating a perpetual cycle of boys disassociating themselves with school, which widens the achievement gap between themselves and female students as they progress into middle and high school. Coeyman (2001) supported these findings and suggests that schools, especially in elementary grade-levels, tend to focus on female interests and reward behaviors that girls are more likely to excel at such as sitting quietly, focusing on detail-oriented tasks, and working cooperatively in groups. Coeyman (2001) suggested that these negative associations with

school early in childhood can later manifest itself as anti-intellectualism in many male high school students, which stands as a barrier to taking advanced courses in high school and pursuing acceptance into college. These extrinsic factors may be perpetuating the gender participation gaps in AP course enrollment as described in this study. Consequently, the student meetings and personal invitations used in this study may be occurring too late in students' academic careers to have an impact on whether they decide to enroll in advanced coursework like AP.

Based on the findings of this study, the College Board's (2015) recommendation that schools meet with students to discuss their academic achievement and invite them to enroll in AP courses is not a successful strategy for increasing enrollment in AP courses. Likewise, this strategy did not create the welcoming environment that Stroman (2019) reports as having an impact on reinforcing students' confidence and improving their enrollment into challenging coursework.

Conclusions

Students' motivation to be academically successful and continue to challenge themselves in school comes in many forms, and a number of intrinsic and extrinsic factors may have a pronounced effect on this motivation (Bryan, Glynn, & Kittleson, 2011; Gillet, Vallerand, & Lafreniere, 2012; Linnenbrink & Pintrich, 2002). In their description of motivation, Linnenbrink and Pintrich (2002) explain it as "a dynamic, multifaceted phenomenon" and not one in which "students are either 'motivated' or 'not-motivated' or that student motivation can be characterized in some quantitative manner between two endpoints on a single continuum" (p. 313). As this current study suggests,

there is not likely one method that schools can use to motivate students to enroll in academically challenging coursework like AP.

During the meetings with individual students to invite them into AP courses, the researcher primarily focused on the academic benefits of enrolling in AP courses, and for many students, especially those already inclined to enroll in AP courses, this may be a strong motivator. However, in their quantitative study of 910 high school students in the southeast United States, Bryan, Glynn, and Kittleson (2011) found some students to be interested and excited about the academic challenges of AP courses, while others used words like "boring" and associated AP courses with "complicated content and tests, and too many facts discouraging learning" (p. 1058). Consequently, students who were less motivated by academically challenging coursework and the benefits that AP courses could have on future academic pursuits may not have found the personal meetings and invitations analyzed in this current study to be impactful.

To better motivate students to take on challenging coursework like AP, these invitations may have been more successful had they been delivered by someone who had a stronger relationship to the students. The meetings in this current study were led by a school faculty member who was not the students' teacher. In their research, Eccles and Wigfield (2000) draw a strong connection between teacher expectancy and student motivation and performance, and they attribute much of this to the relationships that form between teachers and students. In light of this, the meetings and personal invitations in this current study may have had a stronger impact had they been facilitated by the students' teachers, who would not only be able to speak to students' academic

achievements but could also provide anecdotal evidence of students' accomplishments to better convince them of their potential to be successful in AP courses.

Other extrinsic motivators, such as peer and parent influences also might have been utilized to better motivate students to enroll in these courses. Kiuru, et al. (2007) and Gherasim, Mairean, and Butnaru (2012) described the strong effect peers have on high school students, often functioning as informal academic advisors. Rather than solely utilizing one adult who students are unfamiliar with, these meetings might have been more successful if students who are currently in AP courses also would have been in the room to speak about the benefits of these courses and encourage prospective students to enroll. Through this approach, students would see others who they liken to themselves taking these courses and feel that they also could be successful and belonged in this academic setting. Similarly, Parveen and Alam (2008) and Linnehan (2001) analyzed how strong of an influence parents have on students' academic performance and choices. Finding ways to enlist the help of parents to encourage AP course enrollment, in addition to meetings with students, may also increase enrollment.

As this study suggests, motivating students to enroll in these advanced courses is a challenge, and what might motivate some students may not work for others. Rather than taking a targeted approach through one specific strategy, as this study attempted to do, schools most likely will need to take a more comprehensive, long-term approach to build students' confidence in taking challenging academic coursework and recognizing the future benefits of doing so.

Implications for action. This study focused on one strategy to target students who have the potential to be successful in advanced courses and persuade them to enroll

in these courses. The rationale for this strategy is rooted in the idea that if students are better informed about AP courses and that someone believes in their academic skills and abilities to be successful in these courses, they are more likely to enroll in them.

Bryan, Glynn, and Kittleson (2011) suggest a different approach that focuses less on the academics of AP and more on the high-quality teachers in these courses who are caring and enthusiastic and course material that is interesting and practical. This approach might have been more successful with some students in the current study who had the potential to be successful but were less inclined to enroll in these courses. For example, rather than describing how a course like AP Language and Composition helps to improve students' writing abilities, the faculty member might have focused more on the interesting books and engaging learning strategies like Socratic Seminars used in the course. Likewise, the district employee could describe specific, hands-on lab experiments done in a course like AP Biology that students find engaging, rather than focusing on how students can earn college credit by taking this course. This approach might better motivate students who simply are not as driven by academics.

Similarly, using a strategy described by Wakelyn (2009), schools might bring in other students who have taken or are currently taking AP classes to talk to potential AP students and encourage them to enroll. The school might consider taking a targeted approach and select students who are parts of groups underrepresented in these courses, such as male students. This would provide prospective AP students the opportunity to see students who are similar to themselves finding success and enjoyment in these courses. To better enlist the help of families, schools might take an approach described by Bavis, Arey, and Leibforth (2015) in which an Illinois high school hosted an "AP

Enrollment Night" during which prospective AP students and their families listened to a forum made up of current and former AP students who discussed the benefits and challenges of AP courses. The night also included break-out sessions and hands-on activities that showcased some of the projects and work involved in AP courses. Approaches such as this might create the welcoming environment and harness family support to encourage hesitant students to enroll in these courses.

Regardless of the approach taken, schools need to be mindful that a one-time interaction, just before students choose their courses for the following year does not yield positive results as this study revealed. Gottfried, Fleming, and Gottfried, A. W. (2001), examined the results of a longitudinal study that followed 130 children from infancy through high school, determined that students become more academically "stable" as they progressed through their education, which means that once they start down a particular academic route, it becomes more and more difficult to change directions. Consequently, students who enjoy academics and seek out academic challenges are more likely to continue taking challenging coursework the longer they continue with this mindset, while students who begin to dislike their academics and veer away from academic challenges will be more likely to continue to do so the longer they sustain this mindset. Examining the procedures in this current study, trying to motivate tenth grade students to enroll in courses one to two weeks before the enrollment period began may be too late for students who have set themselves on a different academic path, regardless of their past academic successes.

Recommendations for future research. This study found that a school faculty member meeting with students who had the potential to be successful in AP courses and

inviting them to enroll in these courses did not have an impact on AP enrollment. It is recommended that further research be done studying the perspectives of students on why a strategy like this did not affect their course enrollment decisions. Furthermore, gaining students' perspectives on what factors did have an impact on whether they choose to enroll in AP courses or not would provide valuable information for school districts to use as they work to find successful methods to increase their AP enrollment.

The literature reviewed for this study suggested that peers and parents often have an impact on students' academics. Isolating a particular strategy that enlists the help of peers through talks with students or forums and the impact this strategy has on enrollment would be a worthy endeavor. Likewise, studying the impacts that an AP enrollment night or informational letters home had on enrollment might also yield valuable information to schools.

Finally, further information is needed about the participation gap between genders in advanced coursework. Female students are typically overrepresented in most of these courses, and researchers need to find further reasons why males enroll in such smaller numbers. A study analyzing male students' views and understanding of advanced courses like AP would be enlightening and potentially help schools discount many of the preconceived notions that prevent enrollment in these courses.

Concluding remarks. This study's purpose was to isolate one method of motivating students who had the potential to be successful in AP courses to enroll in these courses. Based on the study's results, meeting with students individually to discuss the benefits of AP courses and encourage them to enroll in AP courses just before the enrollment period was ineffective in increasing enrollment. Further studies need to be

conducted to examine the success of other strategies to better help schools motivate students to challenge themselves academically and gain the benefits of taking rigorous coursework like AP. One of the key points to keep in mind is that a strategy that successfully motivates one student may not motivate another, and there is not likely one strategy that will work for all students.

Despite these challenges, schools must find ways to successfully encourage students to enroll in these rigorous courses. As the student data in this study suggests, there are many students who have the potential to be successful in these courses who are not taking these opportunities that could better prepare them for success later in college. This is especially true for male students, who participate in these courses at much smaller rates than females.

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Appendices

Appendix A: Approval of Dissertation Research

Dear Baker University IRB and Mr. Steve Meek:

It is my understanding that Steve Meek will be conducting a research study using data from the [redacted] titled "Exploring the Effect of Inviting Students to Enroll in Advanced Placement Classes: Can Creating a More Welcoming Environment Increase Enrollment". Mr. Meek has informed me of the design of the study as well as the targeted population.

Please use this email as permission to conduct the study as designed using data from the [redacted]. As student privacy is extremely important to the [redacted], the use of personally identifiable student information is not allowed. Permission for this study comes with the expectation that appropriate safeguards are in place to protect student privacy as stated in the request to conduct research.

Again, I support this effort and will provide any assistance necessary for the successful implementation of this study. If you have any questions, please do not hesitate to call. I can be reached at [redacted].

Sincerely,

--

[redacted]

Appendix B: Baker University IRB Approval

Baker University Institutional Review Board

March 30th, 2020

Dear Steve Meek and Harold Frye,

The Baker University IRB has reviewed your project application and approved this project under Expedited Status Review. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Please be aware of the following:

1. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
2. Notify the IRB about any new investigators not named in original application.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents of the research activity.
4. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.
5. If the results of the research are used to prepare papers for publication or oral presentation at professional conferences, manuscripts or abstracts are requested for IRB as part of the project record.
6. If this project is not completed within a year, you must renew IRB approval.

If you have any questions, please contact me at npoell@bakeru.edu or 785.594.4582.

Sincerely,

Nathan D. Poell

Nathan Poell, MLS
Chair, Baker University IRB

Baker University IRB Committee
Scott Crenshaw
Sara Crump, PhD
Jamin Perry, PhD
Susan Rogers, PhD