A Dissertation

entitled

The Impact of High School Exit Exams and Other Predictors on College Readiness: A National Study

by

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Submitted to the Graduate Faculty as partial fulfillment of the requirements for the Doctor of Philosophy Degree in Higher Education

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An Abstract of

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High school exit exams (HSEEs) are administered to approximately 70% of all public school students in the United States. These exams were designed to prepare students to be successful in the workforce and postsecondary education. However, many students are still entering college underprepared. The purpose of this dissertation was to examine the impact of high school exit exams on college readiness. College readiness was defined as enrollment in remedial courses at the first postsecondary institution. Because other factors can influence college readiness, this study controlled for multiple variables (e.g., demographic, educational, school, involvement, intermediate, institutional) using a blocked form of stepwise multiple regression.

Alexander Astin’s Input-Environment-Output (I-E-O) conceptual model and his theory of student involvement were used as the framework for the study. A nationally representative sample of high school students from the graduating class of 2004 was examined using data from the Education Longitudinal Study of 2002. The study found that having an exit exam policy had a negative impact on college readiness, even though certain types of exit exams had a positive impact. The strongest positive predictor was
the highest level of math taken in high school. Stakeholders can use the results of this study to implement alternative strategies to develop high school environments that facilitate preparation for college.
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Chapter One

Introduction

HSEEs (High School Exit Exams) originated from minimum competency exams (MCEs) that were developed to assess students’ math and English skills in the 1970s (Holme, Richards, Jimerson, & Cohen, 2010). These exams became popular and were later adopted by several states as a requirement for high school graduation. Since the 1983 publication of *A Nation at Risk* (National Commission on Excellence in Education), the public education system was criticized for not preparing students with the skills they needed for the future. The book attributed the failure of the schools to the minimum competencies that were required of students and assessed on the exit exams. This criticism led to the movement of standards-based education.

The standards movement grew during President Clinton’s administration. As a result, several states began to draft more rigorous academic standards in the 1990s and developed tests to assess these new standards (Holme et al., 2010).

With the enactment of the No Child Left Behind Act (NCLB) of 2001, all states were required to assess students annually in grades 1 to 8 in reading and math and at least once between grades 10 and 12. Though not mandated under NCLB, several states developed high school policies requiring students to pass an exit exam to graduate from high school. Amrein and Berliner (2002) believed that states with low-performing schools favor HSEEs because of public concern about failing schools. This concern might explain the increase in HSEEs over the past 30 years.

Since the late 1970s, 25 states have adopted exit exams, affecting 69% or 34.1 million public school students in the nation (Center on Education Policy [CEP], 2012).
Exit exams are more prevalent in the southern and southwestern states that have a high percentage of low-income students, students of color, and English Language Learners (ELL). As a result, some researchers have shown that HSEEs have a disproportionate impact on these student groups on graduation and dropout rates (CEP, 2011, 2012; Dee & Jacob, 2006; Marchant & Paulson, 2005; Ou, 2009; Papay, Murnane, & Willett, 2010; Reardon, Atteberry, Arshan, & Kurlaender, 2009; Webb, 2005). Additionally, these exams are more prominent in states that have less school funding per pupil than the national average (Amrein & Berliner, 2002).

The research findings on the impact of HSEEs on graduation and dropout rates have been mixed and often contradictory (Dee & Jacob, 2006; Holme et al., 2010; Marchant & Paulson, 2005; Reardon et al., 2009; Warren & Edwards, 2005; Warren, Jenkins, & Kulick, 2006). Data show that students who do not pass HSEEs on the first try tend to become less motivated and drop out or obtain a GED (Cornell, Krosnick, & Chang, 2006; Ou, 2009; Reardon et al., 2009; Warren et al., 2006). States have information regarding how many students pass HSEEs on the first attempt. However, data are not readily available regarding how many students do not graduate, as a result of not passing the exit exam (CEP, 2012). Furthermore, each state has a different exam. Therefore, it is difficult to compare the level of rigor and students’ academic achievement across states. These issues make it difficult to analyze the full impact of HSEEs. Consequently, “the impacts of exit exams on student achievement, dropout rates, and other outcomes for historically lower-performing groups are not entirely known and have yet to be adequately addressed” (CEP, 2012, p. 4).
There is limited literature on HSEEs and college outcomes. HSEEs in at least three states have been shown to be predictive of SAT scores and college performance in math (Baisey-Jackson, 2010; Cimetta, 2012; Cimetta, D’Agostino, & Levin, 2010; D’Agostino & Bonner, 2009; Guerra, 2009). Conversely, more studies show that HSEEs have not increased academic achievement or college readiness (Amrein & Berliner, 2002; CEP, 2011; Foote, 2007; Grodsky, Warren, & Kalogrides, 2009; Jaffe, 2012; Reardon et al., 2009; Schurdell, 2001; Shuster, 2012; Warren & Grodsky, 2009). In some cases, college preparedness was negatively impacted by the HSEE policy (Marchant & Paulson, 2005).

Although one goal of HSEEs was to prepare students for success after high school, it is estimated that a quarter of all students enrolling in four-year institutions need remedial courses (Kurlaender & Howell, 2012). A higher percentage of students need remediation in two-year colleges than other institutional types. If HSEEs are preparing more students for success after high school, one might expect that more students would enter college with the skills necessary to be successful. However, several other factors impact students’ preparedness for college. These factors include demographic, educational, school and state-level characteristics, and student involvement in educational programs and other activities.

In addition to the lack of data on student achievement, HSEEs can be costly. The estimated costs of HSEEs range from $171 to $557 per student per year with additional costs from $377 to $685 to increase the success rates (CEP, 2004). There are also hidden costs for HSEEs for remediation, professional development, and assistance for English Language Learners (ELL) and students with disabilities.
By 2014, it is estimated that the number of states with exit exam policies will increase from 24 to 31, even though the data do not overwhelmingly show that student achievement has improved (CEP, 2012). Thus, more money, time, and resources will be spent on these exams. Given the increase in exit exam policies, data on college readiness can influence future HSEE policy, particularly in light of the new proposed national assessments.

Forty-six states adopted the Common Core State Standards (CCSS) for K–12 in language arts and math since 2010 (Partnership for Assessment of Readiness for College and Careers website, 2012) to address the issue of preparing students to be college and career ready. New tests that will assess students’ mastery of the CCSS will have cut-off scores for college and career readiness with their administration in 2015. At least 16 states plan to replace their current exit exams with these new assessments.

However, several researchers believe that the new assessments will do little to improve college readiness. They advocate postsecondary institutions’ involvement in designing the assessments as well as clearly defining on a state-level what the institutions expect of first-year students for any meaningful changes to occur (CEP, 2012). Moreover, the new “tests could mean different things for students in various states” (Ujifusa, 2012, para. 16). Though set cut-off scores will determine college readiness, a particular state can define what level the student will need to achieve to graduate from high school. Therefore, students who score below college or career ready might still be allowed to graduate. Consequently, research will need to be conducted on the new assessments in the future to measure their impact on college readiness.
Statement of the Problem

There are numerous articles about HSEEs. The existing literature focuses on the tests’ impact on high school graduation. HSEEs were designed to show that students who successfully passed the exams had developed the requisite skills for success in college or the workplace. However, there is little research on whether HSEEs have increased student achievement (Carnoy, Elmore, & Siskin, 2003; Grodsky et al., 2009; Holme et al., 2010; Reardon et al., 2009; Shuster, 2012; Warren, Grodsky, & Lee, 2008).

Moreover, there is a lack of literature on exit exams and college readiness. Due to the lack of data, there is a need to examine the relationship between the two (Human Resources Research Organization [HumRRO], 2007; Rochford, 2004). This study examined the impact of HSEEs on course-taking patterns in college. Given that other characteristics can influence college readiness; this study used a conceptual and theoretical framework to control for numerous variables including demographic, educational, school, environment, and involvement.

Purpose of the Study

The purpose of this study is to add to the limited body of literature regarding the impact of HSEEs on college readiness. This research updates the literature by using a national longitudinal sample to examine the course-taking patterns of a cohort of students from the Class of 2004 regarding enrollment in remedial courses in English, reading, or math. Though the key research question examines the relationship between HSEEs and college readiness, this study also investigated the impact of additional variables that contribute to college readiness such as demographic, educational, state, school, environment, and involvement characteristics.
Significance of the Study

The study utilized the most recent national data from the Education Longitudinal Study of 2002 (ELS: 2002), thus enabling the researcher to provide insights on the impact of HSEEs. Prior research studies have used data from ELS: 1988. However, this longitudinal data did not capture the most recent changes in exit exams. Additionally, no recent national study has looked specifically at the outcome under study—enrollment in remedial courses. Only a handful of state-level studies has addressed the particular outcome (Garland et al., 2011; Jaffe, 2012; J. J. Lee, 2011; Schurdell, 2001).

Furthermore, no studies have used the conceptual and theoretical framework that was utilized in this study nor investigated multiple variables. Specifically, involvement characteristics have not been examined nor have prior studies controlled for institutional characteristics (e.g., selectivity, type, control) when discussing college performance.

This study is significant given that much time, money, and personnel resources have been spent on exit exams for over 30 years. The number of states with HSEE policies or planned policies will increase to 31 by 2015 (CEP, 2012). This study has national significance given the number of students impacted by HSEEs. There is no consistent data showing that HSEEs have better-prepared students for college even though the exams have been modified to increase rigor since the 1970s.

The findings from the study will help to determine whether HSEEs improve student outcomes on college readiness. Policymakers need to understand the impact of their current state policies, including HSEEs, on different student groups before making informed decisions about future policies. Thus, data from the study can be used to
recommend alternative strategies to monitor student performance and ensure academic achievement besides the use of HSEEs.

**Conceptual and Theoretical Framework**

The conceptual framework used for this study is Astin’s Input-Environment-Output (I-E-O) model. This model is used to assess the effectiveness of educational practices and programs in developing student talent. In this study, the model was used to evaluate the effectiveness of HSEEs in preparing students for college.

According to Astin, inputs refer to personal qualities that students initially bring to the educational experience (Astin, 1993). This study examined student demographic characteristics (e.g., socioeconomic status, ethnicity, gender, parent’s educational attainment) and educational background characteristics (e.g., high school GPA, college aspirations).

Environment refers to everything that happens to a student during an educational program that might influence the outcomes being studied (Astin, 1993). This research examined school characteristics (e.g., enrollment, location, teacher certification) and state characteristics (e.g., HSEE requirement, type of HSEE).

Lastly, outputs refer to the dependent variables or outcomes. In this study, college readiness (e.g., course-taking patterns) was measured. This study examined the impact of HSEEs by controlling for input and environmental variables that might play a role in the college readiness variable. Data on each of the variables (input, environment, and output) came from ELS: 2002.

The theoretical framework for this study was Astin’s student involvement theory. This theory was developed to help researchers and college administrators develop
campus environments that facilitate student learning. According to Astin’s student involvement theory, involvement is defined as “the amount of physical and psychological energy that the student devotes to the academic experience” (Astin, 1984, p. 518). As such, this study looked at various indicators of student involvement in high school (e.g., participation in school-sponsored activities, hours spent on homework, participation in academic programs, parental involvement).

Though the involvement theory was developed for college environments, the basic premise of the theory applies to other educational settings, particularly high schools. Therefore, the researcher tested the theoretical framework in this study.

**Research Questions**

This study sought to answer the following research questions:

1. What influence, if any, do demographic characteristics have on college readiness?
2. What influence, if any, do educational background characteristics have on college readiness?
3. What influence, if any, do school-level characteristics have on college readiness?
4. What influence, if any, do HSEEs have on college readiness?
5. What influence, if any, do student involvement characteristics have on college readiness?
6. What influence, if any, do intermediate characteristics have on college readiness?
7. What influence, if any, do institutional characteristics have on college readiness?

Limitations

Five limitations of this study arise from the data. First, students provided self-reported information regarding whether they took a remedial course in English, reading, and math on a survey. The researcher did not have the official transcripts of the college students and thus could not verify the accuracy of the data provided. Students may not want to report that they placed into remedial courses since there is a stigma attached to these classes that imply that the students are not college ready.

Second, though the data represent a national sample, only one cohort of students who graduated in 2004 is captured. Therefore, findings of the study are not generalizable to other groups. Additionally, since the data represent one cohort, it is impossible for the researcher to address student performance (course taking patterns) before the HSEE policy.

Third, the offering of remedial courses varies by institutional type, resulting in more classes offered at community colleges. Therefore, the results could be impacted if more students in the sample attend schools that offer more remedial courses. Remedial courses are defined differently by the type of institution (e.g., private, public, two-year, and four-year). Based on the policy of the institutions, the number of students who reported taking a remedial course may not have accurately reflected the number of students who placed in remedial courses. The researcher controlled for selectivity and institutional type in this study.
Fourth, due to the Common Core, there will be new assessments in the future in the form of end-of-course exams (EOCs). These new exams are believed to be more rigorous than the HSEEs in the ELS: 2002 data used in this study. Additionally, the new tests are perceived to be aligned with college readiness standards. Therefore, results of this study are not generalizable to these new assessments.

Fifth, students in the sample might not have passed the state’s HSEE, but graduated and entered college by 2006 through alternative arrangements of the state policy. The results of the college readiness levels for those students might be impacted. Thus, the results could be attributed to the students’ preparation level and not the type of HSEE administered in the state.

**Delimitations**

ELS: 2002 consists of several different surveys (e.g., student, parent, administrator, teacher, librarian). The researcher mainly focused on variables from the student survey but added a few necessary variables (e.g., HSEE, parent aspiration) from the parent and administrator survey. This selection was done to reduce the likelihood of missing data from the same students through the different waves of the survey.

**Definition of Terms**

**Accountability.** Being held responsible for the learning and instruction in a public school setting.

**College readiness.** The level of preparation a student needs to enroll and succeed—without remediation—in a credit-bearing general education course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program (Conley, 2007, p. 5).
Common core state standards. A set of rigorous and consistent standards in language arts and math that will be used by each state to assist in preparing students for college or careers.

Comprehensive or standards-based exams. HSEEs that are aligned with state standards at the ninth-grade or 10th-grade level and assess various subject areas (e.g., math, reading, science).

Course-taking patterns. Enrollment in remedial English, reading, or math courses in college.

End-of-course exams. HSEEs that are primarily used to assess grade level skills in a particular subject (e.g., Algebra I, English II) and given at the end of the course.

High school exit exams. State-mandated tests that students are required to pass to graduate from high school that measure reading, writing, and math skills.

High stakes tests. Tests whose results carry grave consequences for students, educators, or entire schools.

HSEE states. States that require its students to take and pass a high school exit exam.

Language arts. High school subject that incorporates reading and English skills.

Minimum competency exams. HSEEs that focus on core competencies below high school level.

New generation assessments. New online common assessments that are being developed to assess students’ mastery of the Common Core State Standards.
Remedial courses. Courses primarily in math, reading, and writing that are designed to improve the basic literacy skills of students who come to college unprepared for college-level work.

Summary of the Introduction

HSEEs were implemented in the 1970s. The research is limited on whether HSEEs have had a positive impact on student achievement. Exit exams have been used by states to demonstrate accountability in preparing their graduates for college or the workplace. Several studies have examined the impact of HSEEs on graduation and dropout rates (Dee & Jacob, 2006; Holme et al., 2010; Marchant & Paulson, 2005; Reardon et al., 2009; Warren & Edwards, 2005; Warren et al., 2006). However, there is also a need to study the impact on college readiness.

As new assessments are implemented in 2015, it is important to understand the implications and impact of future HSEE policy. This study provides information for policymakers and state leaders to make informed decisions regarding future HSEE policies.

Organization of the Study

This research study is organized into five chapters. Chapter One includes the background of the study, statement of the problem, the purpose of the study, the significance of the research, research questions, conceptual and theoretical frameworks, definition of terms, and limitations of the study.

Chapter Two presents a review of the literature, which includes the history of exit exam testing, research on exit exams, college readiness, Astin’s I-E-O model, and the student involvement theory. Chapter Three describes the methodology used in this
research study. It includes information on the research design, data collection, and the data analysis procedures.

Chapter Four presents the study’s findings including descriptive statistics and the results of the data analysis for the seven research questions. Finally, Chapter Five provides a summary of the study, discussion and implications of the findings for theory and practice, recommendations for further research, and conclusions.
Chapter Two

Literature Review

This research study is supported by the review of the literature provided in this section. The literature review begins with an overview of the history of exit exam testing, research on exit exams, and college readiness. The conceptual model and theoretical framework that shaped this research study (Astin’s I-E-O and student involvement theory) are discussed.

History of Competency Testing

Minimum competency exams (MCEs) were administered since the 1970s to assess standards for education and the workforce (Holme et al., 2010). Several states began to adopt these exams and made them a requirement for high school graduation. In 1976, Florida and New Jersey became the first states to require an exit exam (Warren et al., 2006). In 1983, A Nation at Risk criticized the public education system for not successfully preparing students with the proper skills they needed for the workforce. The publication attributed the failure of the schools to the minimum competencies that were required of students. After that, the standards-based education movement began in the nation.

Under President George H. W. Bush, the first National Education Summit was held in 1989 and led to the National Council on Education Standards and Testing (Rochford, 2004). Under President William Clinton, the Improving America’s School Act of 1994 was passed (Barnes, Slate, & LeBouef, 2010). This legislation required state academic content standards and tests, leading to the standards movement (Barnes et al., 2010; Grubb & Oaks, 2007; Holme et al., 2010).
The No Child Left Behind Act (NCLB) of 2001 required all states to assess students annually in reading and math in grades 1 to 8 and at least once between grades 10 and 12. Additionally, schools were expected to make adequate progress over a particular period or face sanctions. Several states developed high school policies requiring students to pass an exit exam though this was not a requirement of NCLB. In fact, 19 out of 25 states with HSEEs also use them for NCLB (CEP, 2012).

There were two primary goals of NCLB; one goal was to close the achievement gap among various student groups (e.g., race, ethnicity, socioeconomic status). The second goal was to develop more rigorous academic standards and accountability measures (Barnes et al., 2010). Years later, research on HSEEs and other state assessments still show that there are achievement gaps by ethnicity and socioeconomic status.

During the 2012–2013 academic year, 25 states required exit exams for high school graduation (CEP, 2012). Many of the states with HSEEs are southern and southwestern states that have a high concentration of minority and low-income students. However, there are a few states outside of these two main geographical areas that administer HSEEs. These states include Indiana, Massachusetts, Minnesota, New Jersey, New York, and Ohio. Warren et al. (2006) concluded that states adopted HSEEs to improve both the economic conditions and educational levels of ethnic minorities. Table 1 displays the number and percentage of students in school in HSEE states.
Table 1

*Number and Percentage of Students Enrolled in School in HSEE States*

<table>
<thead>
<tr>
<th>Student Group</th>
<th>Number of students enrolled in HSEE states</th>
<th>Percentage of nation’s students in HSEE states</th>
</tr>
</thead>
<tbody>
<tr>
<td>All students</td>
<td>34,080,002</td>
<td>69%</td>
</tr>
<tr>
<td>African American</td>
<td>5,771,149</td>
<td>71%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>9,229,730</td>
<td>85%</td>
</tr>
<tr>
<td>Students eligible for free/reduced lunch</td>
<td>15,861,517</td>
<td>71%</td>
</tr>
<tr>
<td>English language learners</td>
<td>3,918,322</td>
<td>83%</td>
</tr>
</tbody>
</table>

*Note.* This table lists the number and percentage of students in HSEE states. Data have been taken based on average state enrollment for the school year 2009-10. Adapted from *State High School Exit Exams: A Policy in Transition*, 2012. Copyright 2012 by Center on Education Policy.

Although all HSEEs assess reading and writing, only 23 exams assess math. Exit exams currently impact 69% of public school students in the nation. HSEEs are administered in grades 10 and 11. However, all states allow students multiple opportunities to re-take the exam.

There are conflicting views regarding the purpose of the exit exams by state policymakers and state education organizations. Although state education associations believe that these tests were designed to measure student mastery of the state standards (CEP, 2012), policymakers implemented exit exams to ensure that a high school diploma prepared students for success beyond high school graduation. The underlying goal of the exit exam policy was to improve teaching and increase the academic rigor of the
curriculum (Holme, 2013). The consequence for students is the same regardless of the intended purpose of the exam; students do not receive diplomas.

Types of Exams

The three types of HSEEs include minimum competency exams (MCEs), comprehensive or standards-based exam (SBEs), and end-of-course exam (EOCs). Exit exams may contain multiple-choice, short answer, and essay questions.

Minimum competency exams. Minimum competency exams (MCEs) are HSEEs that are aligned to academic standards below ninth grade (high school level). The standards assessed on these exams are not aligned with college readiness standards. The low standards were the basis of the criticism of public education in *A Nation at Risk*. During the time preceding the publication, MCEs had been administered. Because MCEs required minimal skills, they could not be used to determine if students were prepared for college or the workplace.

Due to the low achievement levels among students in the nation, states began to impose more rigorous educational standards. As a result, SBEs were created to test students’ mastery of the standards. Ten states had MCEs in 2002 (CEP, 2012). However, by the 2011–2012 academic year, no states administered them.

Comprehensive or standards-based exams. Comprehensive or standards-based exams (SBEs) are aligned with ninth- or 10th-grade state standards. SBEs assess different subject areas (e.g., math, reading, writing). In 2002, only seven states had SBEs (CEP, 2012). By the 2011–2012 academic year, 17 states administered SBEs. Some states assess students’ skills in other subjects like social studies and science.
SBEs are first administered to students in a particular grade level, namely 10th or 11th-grade. Students who do not pass HSEEs on the first try are afforded additional opportunities to retest. Some states also offer remediation to students who have not passed the tests to build their academic skills.

As states have been more concerned with accountability, some started moving away from SBES to more rigorous exams. These exams, called end-of-course exams (EOCs), began in the early 2000s.

**End-of-course exams.** Nine states used EOCs as exit exams during the 2011–2012 academic year. EOCs are used to assess grade level skills in specific courses (e.g., Algebra I, English II) and they provide states with a “standard measure” to assess such skills (CEP, 2008; Education Commission of the States [ECS], 2010). EOCs, unlike SBES, also measure higher order thinking skills (CEP, 2008; Holme, 2013).

Several benefits of administering EOCs include the following: They are designed specifically for one course, which enables the exams to be closely aligned with the content or curriculum of the particular subject (CEP, 2008). Thus, data from EOCs can be more readily used for classroom instructional purposes than data from SBES. EOCs are also given at the end of the course, regardless of the grade level. As such, the exams provide a more accurate measure of knowledge gained from the course as compared with SBES.

Although there are benefits in administering EOCs, the criticism is that they might lower graduation rates due to their difficulty. Since EOCs are fairly new, there is insufficient evidence to either support or refute the claim. Most states have also experienced changes in the calculation of graduation rates (ECS, 2010). For these
reasons, four states administer EOCs but do not require students to pass them for graduation (CEP, 2012). Table 2 is a list of states that currently have exit exams and the type of exam administered.

Table 2

*States With High School Exit Exams and Type of Exam*

<table>
<thead>
<tr>
<th>HSEE States</th>
<th>Type of exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Alaska*</td>
<td>Comprehensive/ SBE (repealed in 2014)</td>
</tr>
<tr>
<td>Arizona</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Arkansas</td>
<td>End-of-course (not for Class of 2014)</td>
</tr>
<tr>
<td>California</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Florida*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Georgia*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Idaho</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Indiana*</td>
<td>End-of-course</td>
</tr>
<tr>
<td>Louisiana*</td>
<td>End-of-course</td>
</tr>
<tr>
<td>Maryland</td>
<td>End-of-course</td>
</tr>
<tr>
<td>Massachusetts*</td>
<td>Comprehensive/ SBE and End-of-course</td>
</tr>
<tr>
<td>Minnesota*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Mississippi*</td>
<td>End-of-course</td>
</tr>
<tr>
<td>Nevada*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>New Jersey*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>New Mexico*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>New York*</td>
<td>End-of-course</td>
</tr>
<tr>
<td>Ohio*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>End-of-course</td>
</tr>
<tr>
<td>Oregon</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>Comprehensive/ SBE (2014) delayed to 2017</td>
</tr>
<tr>
<td>South Carolina*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Texas*</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Virginia*</td>
<td>End-of-course</td>
</tr>
<tr>
<td>Washington</td>
<td>Comprehensive/ SBE</td>
</tr>
</tbody>
</table>

*Note.* The asterisk (*) denotes the states that had exit exams in 2004, the year of the research study (excluding North Carolina and Tennessee). Adapted from State High School Exit Exams: A Policy in Transition, 2012. Copyright 2012 by Center on Education Policy.
Some of the new assessments that will be administered in 2015 can be used as EOCs. As such, there is a concern that more low-income and minority students will be negatively impacted, resulting in more of these students not graduating from high school.

**Future of Exit Exams**

By 2015, at least 31 states planned to have exit exams (CEP, 2012). The increase in exams is partly due to the new Common Core State Standards (CCSS) for K–12 in language arts and math that were designed to ensure that students are college and career ready. The CCSS is an effort spearheaded by The National Governor’s Association and the Council of Chief School Officers. The CCSS are a set of rigorous and consistent standards that will be used by each state to reduce the number of students who need remediation in college (Common Core State Standards Initiative, n.d.). New online tests, referred to as “Next Generation Assessments,” will be developed by two consortia, Partnership for Assessment of Readiness for College and Careers (PARCC) and Smarter Balanced, to assess students’ mastery of the CCSS. At least 18 states plan to replace their current exit exams with these new assessments.

Even though 44 states have adopted CCSS, only 19 of the states have changed their graduation requirements to align with CCSS (Achieve, 2013). Thus, the content and skills required by CCSS may not be adequately covered in many of the states’ current math and English courses. This misalignment will not ensure students’ preparation for college upon high school graduation.

In 2011, the PARCC consortia consisted of 25 states whereas the Smarter Balanced consortia consisted of 14 states and territories (Partnership for Assessment of Readiness for College and Careers website, 2012). Tests in both consortia were
administered to students in grades 3 through 11 starting in the 2014–2015 academic year. Both consortia offered optional assessments for educators to use as diagnostic assessments to identify the particular needs of students in reading, writing, and math. Additionally, two required assessments were administered near the end of the school year. These assessments required students to demonstrate the application of core concepts and skills learned in language arts and math.

Smarter Balanced plans to develop a comprehensive exam in grade 11. States in the consortia can elect to administer exams in grades 9 and 10. PARCC will develop assessments that can convert into EOCs for Algebra I, Algebra II, Geometry, English I, English II, and English III. Several states, though, plan to use a combination of comprehensive exams and EOCs particularly as they develop tests for other subjects including science.

The shift from comprehensive exams to EOCs may present a challenge for some states. Comprehensive exams are administered at one time for a particular grade level. EOCs are administered each time the student completes the course. So, states will have to consider how they will devise their HSEE policy with the new exams.

Many states that currently have an exit exam policy do not know how the CCSS and the new assessments will impact their HSEE policies. California, however, does not plan to replace its current exit exam with the new assessments. One issue involves whether the states will still use other subjects for HSEEs in addition to math and language arts. Another issue concerns whether states will continue with an exit exam policy when they replace their tests. A total of 22 of the 24 states with exit exam policies has adopted the CCSS in both language arts and math (CEP, 2012). Minnesota, though,
has only adopted language arts. Alaska, Texas, and Virginia have not adopted CCSS but have developed statewide college and career readiness standards that have been accepted by postsecondary institutions.

By July 2015, only 11 states were members of PARCC whereas 18 states were members of Smarter Balanced (O’Donnell, 2015). Also, Arkansas is currently in a legal battle over whether they will continue with PARCC. The drop in the number of states from PARCC is due to criticisms about the technical issues in the administration of the new online exams and the length of time for the tests.

There is doubt as to whether the new assessments will impact college readiness. One of the concerns is that the curriculum is not aligned with high schools and colleges in most states. Further, expectations of what colleges expect of first-year students have not been defined on a state-level (CEP, 2012).

Since each state can set which scores are accepted for high school graduation, these new “tests could mean different things for students in various states” (Ujifusa, 2012, para. 16). PARCC will set cut-off scores for college readiness. However, students who score below college or career ready levels might still be allowed to graduate from high school. Consequently, research will need to be conducted on the new assessments to measure their impact on college readiness.

As of July 2015, close to 200 colleges and universities in six states that are administering the Smarter Balanced assessments will use the students’ scores for college placement (Smarter Balanced website, 2015). The six states include California, Delaware, Hawaii, Oregon, South Dakota, and Washington. This decision might be an
indication that college leaders in those states believe that the test scores provide evidence of the students’ college readiness level.

Many state leaders and educators feel that CCSS and the new assessments are putting them a step closer to being able to assess students’ college readiness. Several other leaders believe that these new assessments will be more rigorous. Since the current tests already have a disproportionate impact on several student groups (e.g., minority, low income, ELL), some opponents of exit testing believe that even more students could be denied diplomas in the future. If students cannot graduate from high school, their opportunity to access higher education is in jeopardy.

Though CCSS appear to be the next logical step to improve college and career readiness, Dr. Conley (CEP, 2011) believes that just assessing content in language arts and math will not necessarily increase college and career readiness. He asserted that “success beyond high school requires more than meeting a cut-off score; it requires flexibility and adaptability as a learner and the ability to be a strategic thinker, combined with a sound foundation of the content knowledge” (CEP, 2011, p. 24). More detailed information on Dr. Conley’s concept is described later in the section on “College Readiness”.

There has been great difficulty in assessing the impact of HSEEs because many states implement them at the same time they implement other school reforms. For instance, new teacher evaluations are being implemented at the same time as the new assessments. These evaluations could impact teaching and learning, thus affecting the outcomes of HSEEs.
State leadership influences the future of exit exams. Changes in leadership could affect HSEE policy because of the varying political views about the importance of accountability measures.

A review of the literature shows that states moved to SBEs because MCEs lacked academic rigor (CEP 2008, 2012; ECS, 2010; Holme et al., 2010). Consequently, states moved to EOCs because they offer several advantages over SBEs. However, there are still achievement gaps between minority and low-income students despite the revisions of the exams. Moreover, the data does not indicate any substantial increases in academic achievement (Grodsky et. al, 2009; Holme et al., 2010; Reardon et. al, 2009; Shuster, 2012). The lack of data seems to suggest that a test does not ensure that teaching and learning are occurring. Consequently, it is too early to tell if the new exams will increase academic achievement even though they are purported to have more rigor than the prior assessments.

**Pros and Cons of High School Exit Exams**

There are several advocates and opponents of HSEEs. Some advocates include governors, chief state school officials, state boards of education, community business leaders, higher education leaders, and faculty members. Conversely, some opponents of HSEEs include teachers’ unions and student advocacy groups, particularly for students with disabilities.

Advocates of HSEEs believe that students who pass the exit exams and graduate from high school demonstrate that they have met a certain level of standards and are prepared for college or the workplace. One of the main criticisms of standardized testing is that the students’ ability to graduate is tied to only one measure, the HSEEs. However,
learning does not occur by simply mandating a test. The test score does not determine the extent to which students will be successful after high school graduation. Having an exit exam policy also does not ensure that students had the opportunity to learn the material for which they are tested.

Advocates of HSEEs also believe that the tests are a signal that the state has accountability and high standards. Richard Riley, former Secretary of Education, responded to the Improving America’s Schools Act of 1994 (IASA) by stating,

It is imperative that we recognize that our national effort to raise standards is not just about testing . . . States should not rely on just a single high-stakes test . . . I believe that these tests and other accountability measures will be useful if, at the same time, we build capacity of schools and students to meet the challenge.

(Riley, 2002, pp. 700, 703)

Currently, HSEEs assess states’ accountability in preparing students for college or the workforce. Advocates of HSEEs believe that schools should be responsible for educating its students. However, HSEEs are “high stakes” tests. The American Educational Research Association (AERA, 2000) stated, “Certain uses of achievement test results are termed ‘high stakes’ if they carry serious consequences for students or educators” (para. 3). HSEEs are controversial because students are denied a high school diploma if they do not pass the exams. The tests can negatively impact students’ access to higher education. The lack of access is particularly troubling since all of the available jobs by 2020 will require at least some type of college training (Hyslop, 2014).

States are held accountable for student achievement in that they receive incentives or penalties based on school and student outcomes. The incentives are given so that
schools can provide better instruction. At least 22 states offer financial incentives to their schools for high or improved test scores (Amrein & Berliner, 2002). Test scores are publicized in school and district report cards in 45 states. At least 27 states use ratings and rankings for accountability. Based on the ratings/rankings, states have the authority to close, reconstitute, or take over low-performing schools. Some other penalties involve replacing teachers or administrators and revoking a school’s accreditation.

The underlying assumption about the use of HSEEs is that students will be motivated to take more challenging courses and work harder to pass the exams, particularly because their diploma depends on them passing the tests (CEP, 2004; Holme, 2013; Reardon et al., 2009). Additionally, teachers and administrators would be motivated to work harder so that students obtain the necessary skills to pass the exams (Carnoy & Loeb, 2002; Grubb & Oaks, 2007; Hanushek & Raymond, 2005). However, data have shown that HSEEs have not significantly increased student academic achievement (Carnoy et al., 2003; Grodsky et al., 2009; Holme et al., 2010; Reardon et al., 2009; Shuster, 2012; Warren et al., 2008).

Interesting enough, few studies show that exit exams have little effect on graduation rates (Davenport, Davidson, Kwak, Irish, & Chan, 2002; Greene & Winters, 2004; Warren & Edwards, 2005). Other national studies show that exit exams reduced graduation rates (Amrein & Berliner, 2002; Dee & Jacob, 2006; Marchant & Paulson, 2005; Warren et al., 2006). Studies on the impact of graduation rates have been criticized because states often do not factor in students who move, leave, or earn a GED.

Opponents of HSEE policy believe that exit exams cause teachers to “teach to the test” and be less innovative in their teaching strategies (Holme, 2013; Marchant &
Exit tests have also been shown to divert attention away from helping students to become college ready by focusing mainly on the particular content students need to pass the tests (Garcia, 2003; Perna, 2008). If HSEEs are aligned to college readiness standards, then students should be able to both pass the test and be prepared for college.

Higher education faculty advocate for HSEEs aligned with college readiness standards to reduce the number of students who come to college unprepared while business leaders support HSEEs so that students have the skill sets for the workplace. Although HSEEs have evolved over the years, research shows that the exams are not rigorous enough to accurately assess the skills deemed necessary for success in college (CEP, 2012; Conley, 2003; Kurlaender & Howell, 2012; Rochford, 2004; Warren et al., 2006).

HSEEs tend to focus on students meeting basic competency requirements. John Robert Warren, a professor at the University of Minnesota, and expert on exit exams, stated the following,

The exams end up not benefitting students who pass them while still hurting the students who fail them. The exams are just challenging enough to reduce the graduation rate, but not challenging enough to have measurable consequences for how much students learn or for how prepared they are for life after high school. (Warren & Grodsky, 2009, p. 645)

In addition to the perceived lack of rigor, the secondary and postsecondary systems in most states function separately from one another. Consequently, high school
graduation requirements, including exit exams, are not aligned with the assessments colleges use to determine students’ readiness for college-level work (CEP, 2004).

Despite the criticisms of exit exams, roughly 70%–90% of students pass the exams on the first attempt (CEP, 2012). For some these data raise questions about the rigor of the exams. However, states calculate passage rates on exit exams differently. This calculation makes it impossible to assess accurately the impact of exit exams on student achievement since state-to-state comparisons cannot be made (CEP, 2012). Although a high number of students pass the exams on the first attempt, many believe that the students who do not pass the tests become discouraged and drop out of school (Cornell et al., 2006; Ou, 2009; Reardon et al., 2009; Warren et al., 2006).

**Lack of evaluation of HSEEs.** HSEEs have not been evaluated adequately by the states that administer them. Thus, CEP (2002) recommended more monitoring by states of the consequences of exit exams, specifically looking at the impact of the tests on postsecondary outcomes. California is one of only a few states that conduct an annual independent review of its HSEE by the Human Resources Research Organization (HumRRO, 2007). One such evaluation influenced the development of a new exit exam in the state (CEP, 2004). Moreover, there were five independent evaluations conducted before California began withholding diplomas in 2006.

It has been difficult to assess the effectiveness of HSEEs and to study the long-term impact because states have not developed mechanisms to monitor the outcomes for students who either pass or fail the HSEEs (CEP, 2004). As states continue to mandate HSEEs, they should be aware of the impact of the tests on various student outcomes.
**Costs and resources of high school exit exams.** Resources have been spent on HSEEs over the past 30 years. The exact, comprehensive costs of HSEEs have been difficult to ascertain. There was an attempt by the researcher to obtain such data. There are no current data on the national average costs of HSEEs. However, the most recent estimated costs of implementing HSEEs ranged from $171 to $557 per student per year in 2004 (CEP, 2004). These costs increase by $377 to $685 when changes are made to the tests or when states try to increase student success rates (CEP, 2004). The general costs to create HSEEs are relatively inexpensive. Many other hidden costs include costs for remediation, professional development, assistance for ELL, and students with disabilities. These hidden costs make it difficult to determine actual costs for implementing HSEEs.

**Delays in implementation of exit exams.** Due to oppositions to exit exam testing, there have been several delays and adjustments in the implementation of the tests in several states. These delays have mainly been enacted to avoid denying diplomas to a large number of students (CEP, 2012). However, other cases have involved state lawsuits over the fairness of exit exams and delays due to political changes in leadership.

In 2003, only 37% of the juniors and seniors in New York passed its HSEE (CEP, 2012). The community expressed concerns because to the rigor and unfairness of the tests’ cut off scores. The HSEE policy was delayed until the graduating class of 2008 after an independent panel was charged with researching the test.

In January 2006, Utah decided to suspend its policy of withholding diplomas to students who did not pass the exit exam. Sixteen percent of the seniors in the class of 2006 had not passed all three sections of the exit exam. Oregon delayed the
implementation of its exit exam from 2008 to 2014. At the time of the implementation, half of the sophomores had failed the exit exam on the first attempt (CEP, 2012).

Alabama, Arizona, and Washington delayed the implementation of their exit exam policies in 2008. Test scores revealed that a disproportionate number of minority students would have failed the exams. As a result, the states lowered the standards assessed on the tests (Urbina, 2010). Recently, Connecticut delayed the implementation of its exit exam until the graduating class of 2020 (CEP, 2012). In May 2014, Rhode Island delayed its HSEE from the Class of 2014 (the first class under the new requirement) to the Class of 2017 (Staff, 2014a). These recent delays highlight many of the problems with HSEE policies.

Other alternative arrangements have been made in some states due to criticisms of the exit exam policies. Florida was allowed to use scores from other exams such as the SAT, PSAT, PLAN, ACT, and military entrance exams instead of the Florida Comprehensive Assessment Test (FCAT) as a graduation requirement in 2003. In that year, 12,500 seniors, mainly minority students, would not have graduated because they had not passed all parts of the exam (CEP, 2012). Oklahoma established an appeals process for students to provide evidence of extenuating circumstances that would prevent them from graduating due to test scores. Other states have implemented alternate diplomas or certificates when students do not pass the exit exam.

Instead of delaying or developing alternative routes to graduation, some states (e.g., Florida, Texas, California) have made other decisions regarding exit exams. These decisions include the allocation of special funds to help students pass HSEEs, the use of
practice tests and other intervention programs, and alternative assessments for students with learning and language difficulties.

Other states, including Ohio, lowered their test scores to address gaps in student achievement (CEP, 2012). Opponents of exit exam testing believe that if the exam scores are lowered to ensure that more students are graduating, then the exam cannot give an accurate assessment of students’ college or career readiness skills (CEP, 2011).

Though there are benefits to administering HSEEs, the negative implications seem to be overwhelming. There are significant costs and a definite lack of evaluation protocols for HSEEs making it impossible to determine their impact. Lastly, there have been several delays in the implementation of the tests due to perceived unfair practices and low graduation rates. These factors should cause concern about future HSEE policies.

At the least, the lessons learned suggest that there is a need to phase in any HSEE over several years to give students in lower grades the opportunity to learn the new content knowledge. CCSS has just recently been adopted, and new assessments are still being developed. Some states have already decided to replace their current HSEEs with the new assessments.

**Impact of High School Exit Exams**

**Positive impact.** Though there are several studies about HSEEs, there is a dearth of literature on the effects of HSEEs on college readiness (CEP, 2002; HumRRO, 2007; Rochford, 2004). The majority of the studies cover state-level data particularly in Arizona, Texas, and California. There is difficulty in assessing the impact of HSEEs
because exit exams vary by state. Consequently, limited studies have been done using national data.

Studies on the Arizona Instrument to Measure Standards (AIMS) exit exam show that it is a useful predictor of college performance (Cimetta, 2012; Cimetta et al., 2010; D’Agostino & Bonner, 2009). Cimetta et al. (2010) investigated whether AIMS was as useful as the SAT in predicting college readiness for students attending the University of Arizona. AIMS scores in reading, mathematics, and writing as well as SAT verbal and math scores were analyzed for a sample of 1,673 students from the Class of 1999 cohort and 2,222 students from the Class of 2000 cohort. The study found that the AIMS exit exam, at least for one cohort, was a useful indicator of college readiness.

The AIMS test performed as well as the SAT in predicting college performance as evidenced by the first-year college grade point average (GPA) and cumulative college GPA in the 2000 cohort. For the 1999 cohort, AIMS did not explain any additional variance after including high school GPA in the analysis. There were no significant effects of different ethnic groups. However, a limitation of the study was that it used the old version of the SAT. The findings of this particular study might not be generalizable to the newer version of the SAT.

In another study (Cimetta, 2012), AIMS test scores were analyzed for nearly 2,734 students enrolled at the University of Arizona. The study found that AIMS math scores were predictive of students’ performance in college. Higher math scores on AIMS were associated with better performance in the college math courses (Cimetta, 2012). Both studies (Cimetta, 2012; Cimetta et al., 2010) using AIMS test scores were limited in
that they included only one institution. Therefore, results of the study are not
generalizable to other institutions in Arizona or other states.

A study of Washington’s exit exam, Washington Assessment of Student Learning
(WASL), yielded similar findings in that the test was as predictive as the SAT or ACT
(McGhee, 2003). WASL test scores for a sample of 7,509 students from the Class of
2001 who enrolled at five different state universities were used to predict the validity of
the scores on college performance. Students who scored high on WASL also had high
first-year GPAs. WASL was as predictive of first-year GPA as the SAT and ACT in that
each of the tests accounted for roughly 30%, 29%, and 32% of the variance in the college
GPA, respectively. However, 29% of the students who failed the math portion of WASL
earned an average GPA of 2.7, which raised a question about the predictive validity of
the WASL math scores.

In Texas, Baisey-Jackson (2010) investigated the relationship and predictability of
specific educational and demographic factors of 115 African American high school
students’ college preparedness as defined by SAT scores. Among the variables under
study were GPA, curriculum, class rank, socioeconomic status, and exit exam results.
Four predictors of college readiness emerged from the multiple regression analysis. The
predictors were: the students took Advanced Placement (AP) classes, had a high grade
point average, performed well on the Texas Assessment of Knowledge and Skills
(TAKS) exit exam, and ranked near the top of their class.

The study implies that participation in a rigorous high school curriculum alone
will not lead to college readiness. Excelling in the rigorous curriculum leads to higher
exit exam scores and college readiness. Baisey-Jackson’s study (2010) included a small
sample from a particular region of the state. Other research shows that high school GPA and participation in AP courses are reliable predictors of college success (American Institutes for Research [AIR], 2013; Kuh, Kinzie, Bridges, & Hayek, 2011; Pike & Saupe, 2002).

Guerra (2009) investigated the relationship between the high school mathematics curriculum, score on the Texas exit exam (TAKS), and score on the college placement test (Algebra ACCUPLACER) using a sample of 830 first-year community college students. The study found that participants who met the college-ready mathematics standard on TAKS increased their high school mathematics grade. The students had also taken upper-level math courses. Additionally, the students scored at the college ready mathematics level on the Elementary Algebra ACCUPLACER and passed their college mathematics course (college-level or remedial). Though this study included only one institution, the researcher used a good sample size. The TAKS studies seem to suggest that this HSEE might be more aligned with college readiness standards than exit exams in other states.

A Virginia study (Garland et al., 2011) analyzed scores from the Standards of Learning (SOL) end-of-course exit exam for 32,614 students who enrolled in college in fall 2008. The results showed that there was a strong and statistically significant relationship between SOL test scores in reading and Algebra I and the probability of enrolling in remedial courses. As the score on the SOL increased, the likelihood of students placing in remedial courses decreased.

There was a relationship with the type of diploma students received and remedial course placement. Students who earned Advanced Studies diplomas placed in remedial
courses at a much lower rate than students who received Virginia’s Standard diplomas. The major difference between the Advanced Studies diploma and the Standard diploma is the number of credit hours; the Advanced Studies diploma requires one additional course credit in mathematics, laboratory science, history and social science, respectively, and at least three credits in a foreign language (Garland et al., 2011). This study demonstrates the importance of the high school curriculum in preparing students academically for college.

In a 2007 evaluation of the California High School Exit Exam (CAHSEE), data showed that college enrollment dropped from 2000–2007. However, since 2007, college enrollment increased as the proficiency level of students on the CAHSEE increased (HumRRO, 2012). The Human Resources Research Organization (HumRRO) evaluations in California have also tracked student participation in Advanced Placement, ACT, and SAT tests. Since the implementation of CAHSEE, there has been a general increase in participation in the tests even though average test scores have fluctuated.

Massachusetts has been cited for high passage rates on the Massachusetts Comprehensive Assessment System (MCAS) exit exam (Hyslop, 2014) even though the HSEE is considered more rigorous than other states’ exams. However, critics in the state do not believe that the success on the tests has impacted placement in remedial courses, particularly at the community college-level (Shaw, 2006). One of the reasons for this is that the passing score on the test is considered to be at a “basic level.”

However, findings from a study of 2005 graduates in Massachusetts showed that there was a positive relationship between high test scores on the MCAS and enrollment in four-year universities. More than 50% of the students who scored at the advanced and
the proficient level enrolled in four-year universities. In contrast, less than one-third of the students who scored at the lowest passage level (needing improvement) in math enrolled in four-year universities (Roderick, Nagaoka, & Coca, 2009).

The same study found that half of the students who scored at the lowest passage level placed in remedial math at the four-year colleges as compared to 20% who scored at the proficient level and 4% who scored at the advanced level (Roderick et al., 2009). Whereas this study shows that the MCAS might be correlated with college readiness or predictive of placement in remedial math, the authors suggested that the proficient level is probably more demonstrative of minimal college readiness skills in math.

Research using national datasets have shown that exit exams have increased student achievement and college enrollment. Bishop and Mane (2001a) used an unreported sample from the High School and Beyond (HSB) dataset and found that low and average achieving students were more likely to enroll in college four years after high school graduation if they were from states with MCEs.

Another study (Bishop & Mane, 2001b), using data from roughly 12,000 students from the National Education Longitudinal Study of 1988 (NELS), confirmed the previous finding (Bishop & Mane, 2001a). Though the study controlled for several variables (e.g., demographic, school, community), students from states with MCEs were more likely to attend college than students from states without exit exams two years after graduation, regardless of their high school GPA. Unlike the study using HSB data, there were no significant effects one year after graduation. A plausible explanation is that students might be delayed at least one year of graduating due to the time required for them to pass the exit exam (Bishop, Mane, Bishop, & Moriarity, 2001).
Daun-Barnett and St. John (2012) examined the effects of HSEEs by extrapolating data from 1990–2008 from the College Board, the Integrated Postsecondary Education Data System (IPEDS), the Common Core of Data (CCD), the Census Bureau, and Mortenson’s (2010) *Postsecondary Opportunities*. The study concluded that even though HSEEs prevented some students from graduating from high school, a larger percentage of graduates enrolled in college after high school. The increase in college enrollment was consistent in analysis within or between states.

Amid criticism, some studies show that HSEEs have increased student achievement and college enrollment. The previous research shows that four HSEEs—AIMS, MCAS, TAKS, and SOL—are predictive of college readiness skills, specifically in math. It is important to note that AIMS, MCAS, and TAKS are comprehensive exams, whereas SOL is an EOC. Based on the literature, EOCs are supposed to be more rigorous than comprehensive exams. Though these studies show a positive impact on HSEEs, the research in this area is very limited specifically as it relates to placement in college-level courses.

**Negative impact.** “It is widely assumed that if students pass state tests that are aligned with state standards, their school is doing a good job of educating them, and if they pass the state’s exit exam, they are ready to face the challenges of college” (Foote, 2007, p. 359). However, the data do not confirm that assumption.

Overwhelmingly, studies show that exit exams have done little to increase the achievement level of students (CEP, 2008; Grodsky et al., 2009; Holme et al., 2010; Reardon et. al, 2009; Shuster, 2012; Warren & Grodsky, 2009). In fact, some studies show that HSEEs have not increased college readiness as determined by SAT and ACT
scores (Amrein & Berliner, 2002; Foote, 2007; Marchant & Paulson, 2005). Some HSEEs have been correlated with a student’s need for remediation in college (Jaffe, 2012; Schurdell, 2001). The data regarding HSEEs show many adverse impacts on academic achievement and graduation rates. It is no wonder there are limited studies regarding HSEEs and college readiness.

Schurdell (2001) examined the relationship between the Ohio Ninth Grade Proficiency Test (ONGPT), an MCE, and the need for remedial coursework in college among 103 students from a suburban high school. Using regression analysis and controlling for such variables as high school grade point average (HSGPA), College Entrance Examination Board (CEEB) scores, and gender, Schurdell found that the number of attempts to pass the ONGPT was significantly related to placement into remedial courses in college. Students who attempted the ONGPT more than once were more likely to need remediation. At least 33% of the sample took either remedial math or reading courses in college.

Surprisingly, it was discovered that ONGPT success was related to the composite score on the ACT even though the ONGPT was a minimum competency test. One unexpected finding was that HSGPA did not predict the need for remediation. Though the 33 different institutions that the students attended used various measures to place students into remedial courses, the type of institution was not found to be statistically significant.

Jaffe (2012) also studied students in California to ascertain the role of mathematics as a roadblock to college completion for community college-bound students. The sample of 903 students came from a diverse public high school in regards to
ethnicity and socioeconomic status. The sample consisted of four high school graduating classes. Student records were linked with COMPASS math placement scores for students who enrolled at the community college. According to the findings, three significant predictors of placement in remedial mathematics courses were grades in ninth grade math courses, CAHSEE math scores, and no math course taken in grade 12. The findings revealed that CAHSEE predicts placement into remedial math courses in college.

While students take the CAHSEE in the 10th-grade, they have the opportunity to participate in the Early Achievement Program (EAP) in the 11th-grade, which assesses their college readiness level. A certain score range on the assessment exempts students from taking the California State University System placement test for college. Close to 50% of the students who scored at the advanced level on the CAHSEE in language arts did not earn scores high enough to exempt them on the EAP. Though fewer students take the EAP in math, only 26.3% of students who placed at the advanced level on the math CAHSEE were exempt on the math EAP (HumRRO, 2012). These results suggest why the colleges use EAP scores as opposed to CAHSEE scores.

Prior research has shown the negative impact of HSEEs on students of color, low-income students, and English Language Learners (CEP, 2012; Garcia, 2003; Kurlaender & Howell, 2012). English Language Learners (ELL) in Arizona, California, New Mexico, and Texas had lower scores on HSEEs and were less likely to attend college than other student groups (Garcia, 2003). For English Language Learners, HSEEs assess not only content knowledge but also knowledge of English language. Individuals opposing the HSEE policy believe that the exams were designed for native English speakers and had an adverse impact on English Language Learners.
Although there is more research that involves state-level data, the effects of HSEEs have also been analyzed using national data. J. J. Lee (2011) examined the impact of high school exit exams on college preparation among 6,748 students with data from the National Longitudinal Survey of Youth of 1997 matched with data from the Common Core. This data consisted of five nationally representative cohorts who were born from 1980–1984 and tracked them through college completion, or age 25. College preparation was defined as attending college without taking remedial math. The study used multiple regression for data analysis. The results showed that HSEEs decreased both the difficulty of the coursework for the hardest math class and college preparation. Lee’s study, though, did not control for the institutional type. Different institutional types can affect the outcome of the study since remedial offerings vary by type.

It would appear that the two findings in Lee’s study would be correlated in that more students would need remedial courses in math if they did not have a rigorous math curriculum in high school. The study is limited in that the data included students who graduated up to 2001. Therefore, the results might not be generalizable to the exams that emerged after 2000.

College entrance exams such as the ACT and SAT have been used in studies to compare the impact of HSEEs on college readiness. One national sample of 694,900 students found that students in states with HSEEs performed worse on the SAT than students in states without HSEEs (Marchant & Paulson, 2005). The lower SAT scores seem to confirm that HSEEs cause teachers to teach to the test and drill students on material covered on the test. However, the SAT does not measure specific curriculum taught in schools, but rather students’ ability to reason and solve problems. Students of
color and those from low-income families received lower scores on the SAT. There was a positive relationship between a smaller group of higher-achieving low-income students and SAT scores, which might infer that these students were focused on the structure and content of the test.

Marchant and Paulson (2005) did not control for poverty level of the states or the individuals (Holme et al., 2010). The poverty level is significant given that HSEEs are mainly concentrated in states with low-income students. Nonetheless, the SAT has been associated with lower scores for minorities.

Amrein and Berliner (2002) examined ACT, SAT, and AP scores using national longitudinal data since 1977 (college admissions tests) and 1995 (AP) with an archival time series analysis. The results of the data analysis showed that 67% of the states with HSEEs had decreases in ACT scores since the implementation of exit exams, and 57% of the states had decreases in SAT scores. During 1995–2000, there was no increase in scores on the AP exams. The college readiness levels of students declined in this national study since exit exams were introduced.

Whereas each of the studies showed a negative impact of HSEEs on college entrance exam scores, it is important to note that studies using the ACT or SAT as a measure of academic achievement do not include students who are not college-bound. The intent of HSEEs was to improve the educational outcomes for all students. Consequently, there is a limitation in generalizing to the larger population when evaluating the impact of HSEEs on the achievement levels of students from these studies.

Although some studies show a positive effect of HSEEs, more studies show that HSEEs have not increased college readiness levels. In other studies, HSEEs have been
associated with college remediation. Given that the primary purpose of HSEEs is to enhance academic success beyond high school, it is evident from the review of the literature that this goal has not been realized after 30 years.

**College Readiness**

College readiness is a term that is commonly used in K–12 and postsecondary institutions. However, the term means different things to different people. For the purpose of this study, college readiness is defined as “the level of preparation a student needs to enroll and succeed—without remediation—in a credit-bearing general education course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program” (Conley, 2007, p. 5). According to this definition of college readiness, students who place in remedial courses in English, reading, and math would not be deemed “college ready.”

**Measuring college readiness.** Transcript analysis and test scores on the ACT and SAT are often used as a measure of college readiness. Transcript course titles are reviewed and analyzed based on their rigor. Other factors that are examined in transcripts include the number of credit hours earned and GPA.

ACT scores are analyzed by the benchmarks that have been established to measure college readiness. According to the ACT benchmarks, students who obtain a minimum score in the subject area (e.g., English, math, science) have about a 75% chance of getting a “C” or higher in corresponding credit-bearing first-year college courses (ACT, 2005).

According to the SAT benchmarks, a score of 1550 indicates that students have a 65% chance of obtaining a “B-” average or higher during the first year of college (Wyatt,
Remigio & Camara, 2012). The subject level readiness benchmark for reading, math, and writing is 500, respectively. These indicators are correlated with overall first-year grades, not to particular courses like the ACT; the indicators are linked to a range of subjects for first-year students (Wyatt et al., 2012). Although the SAT benchmark is a good aggregate measure of the college readiness for a group of students, it is not designed to evaluate the college readiness level of individual students.

Another measure of college readiness is enrollment in remedial courses (NCES, 2013). Typically, students who enroll in remedial courses do so because they have placed into those classes by a college’s placement test. Different colleges, though, use different placement tests to assess students. Therefore, there is no consistent cut off scores for all institutions.

[In fact,] more than two-thirds of states do not have a commonly agreed-upon score on a placement test for entry-level, credit- bearing mathematics and literacy courses (e.g., ACT, SAT, COMPASS, Accuplacer, state-developed assessments) in their public two- and four-year colleges and universities. (Achieve, 2012, p. 29)

Consequently, a student could place in a remedial course at one institution, but not at another. For the purpose of this study, the researcher measured college readiness by enrollment in remedial courses in English, reading, and math.

A problem with gauging the level of college readiness by student enrollment in remedial courses is that institutions have different policies on placement in remedial courses (Kurlaender & Howell, 2012). At some institutions, any student who places in remedial courses must continuously enroll in the courses until they complete them. However, at other institutions, enrollment in remedial courses might be strongly
encouraged, but not mandated or enforced. Additionally, an enrollment figure for remedial courses usually come from self-reports of students thereby creating a limitation regarding the accuracy of the information reported. All of these practices make it difficult to determine exactly how many students place and enroll in remedial courses.

**Remedial courses and institutional type.** A review of remedial course-taking patterns from 2007–2008 showed public universities had the highest rates of enrollment (24% and 21%, respectively) as compared to all institutional types except institutions with open admission policies (NCES, 2013). Two-year private institutions had lower remedial course enrollments than four-year private institutions at 11.0% and 15.1%, respectively (NCES, 2013). Typically, private institutions offer less remedial courses than public institutions. Additionally, from 1999–2008, the remedial course-taking rates in private two-year institutions consistently decreased (NCES, 2013). Regarding selectivity, higher enrollment rates in remedial coursework were more prevalent in institutions that were minimally selective and had open admissions policies. The rates of remedial coursework are impacted by the offerings of each institutional type.

During 2011–2012, 99.5% all of the public two-year institutions offered remedial courses as compared to 75.7% of public four-year institutions. However, only 60% of private institutions offered remedial courses (NCES, 2012) during that time. Depending on the placement procedures, students enrolling in two-year or four-year public institutions have a greater likelihood of placing in a remedial course than students who enroll in private institutions.
Exit exams, college admissions, and course placement. A few states use scores on exit exams either in admissions decisions or placement in college-level courses. These states include Florida, Georgia, New York, and Oregon (CEP, 2011).

Florida. Students in Florida who score a level 4 or 5 on its exit exam, 10 FCAT, are exempt from taking the state college readiness test if they enroll in an institution of the Florida College System within two years of taking the FCAT. A score of 3 is considered proficient enough to graduate from high school. The state college readiness test is used to place new students entering college into the correct reading, writing, or mathematics course.

Georgia. The Georgia High School Graduation Test (GHSGT) is the HSEE for Georgia. If students attain the Advanced Proficiency or Honors level on the GHSGT, several of the state institutions will permit the student to enroll in college-level courses without having to take a placement test.

New York. In the state of New York, students take the Regents End-of-Course Exams. A score of 75 on the Regents English EOC and a score of 80 on a Regents Math EOC are considered college ready at institutions in the state and correlates with success in first-year college courses.

Oregon. In the state of Oregon, students can select the Oregon Assessment of Knowledge and Skills (OAKS) as one of the assessments to fulfill the exit exam requirement (CEP, 2012). The Oregon University System (OUS) started granting automatic admission to students in fall 2012 that had achieved a particular score on the OAKS and also met a minimum grade point average. The required score exceeds the level of proficiency needed to pass the exam.
Though only four states use exit exam scores in admissions or college placement decisions, the use of such scores is indicative of the belief that exit exams are useful in determining college readiness levels. A recent study by Complete College America (CCA, 2012) found that students in Georgia enter community colleges needing less remediation than students in many of the other states. Also, Oregon and New York had a small percentage of students entering four-year institutions requiring remediation at 11.4% and 14%, respectively (See Table 3). Thus, exit exams in these two states counter the argument of their lack of rigor in preparing and assessing readiness for college.

As stated earlier, since the new generation assessments have been administered in 2015, universities in six states are using the scores for college placement (Smarter Balanced website, 2015). The six states include California, Delaware, Hawaii, Oregon, South Dakota, and Washington.

**States administering college admissions tests.** At least nine states in 2011–2012 had a policy that required their students to take a college entrance exam like the ACT or SAT (CEP, 2012). Additionally, three states are considering the ACT and SAT as a requirement in the future. States that require students to take a college entrance exam do not have an exit exam; Louisiana is the exception.

It is plausible to think that state policymakers view exit exams as serving a similar purpose as a college entrance exam given that only one state requires both. The major difference, however, is that college entrance exams are not high stakes exams in that high school diplomas are not withheld. Conversely, the use of the ACT/SAT could signal that these exams are better in predicting college readiness than any exit exam.
**Trends in college readiness.** The publication of *A Nation at Risk* in 1983 revealed the critical state of education in the United States. Between 1975 and 1980, one-quarter of the math classes taught in four-year colleges were remedial classes (National Commission on Excellence in Education, 1983). SAT scores in both verbal reasoning and math declined from 1963 to 1980. Lastly, the number of students who tested in the highest ranges on the SAT also declined. Given that the SAT is used to measure college readiness declines on the test reveal a decrease in those skills.

There has been an increase in the number of high school students who have aspirations to attend college. Significant disparities, though, remain in college readiness and enrollment (Roderick et al., 2009). Consequently, it is hard to ascertain the exact number of students needing remediation in college.

From 1999–2000, 26% of all first-year students enrolled in remedial courses at postsecondary institutions. The rates declined in 2003–2004 but slightly increased to 20% in 2007–2008 (NCES, 2013). However, the recent figures reveal, “more than 50 percent of students entering two-year colleges and nearly 20 percent of those entering four-year universities are placed in remedial classes” (CCA, 2012, p. 2). Overall, it does not appear that the rates of remediation are decreasing over time.

Table 3 shows the percentage of students needing remediation in the states that administered exit exams in 2011. The data comes from Complete College America (2012).
Table 3

*Percentage of Students Needing Remediation by States With Exit Exams*

<table>
<thead>
<tr>
<th>HSEE States</th>
<th>Percentage of students needing remediation (two-year colleges)</th>
<th>Percentage of students needing remediation (four-year colleges)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>44.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Alaska</td>
<td>Not available</td>
<td>Not available</td>
</tr>
<tr>
<td>Arizona</td>
<td>59.3 *</td>
<td>Not available</td>
</tr>
<tr>
<td>Arkansas</td>
<td>43.2</td>
<td>Not available</td>
</tr>
<tr>
<td>California</td>
<td>Not available</td>
<td>59.6</td>
</tr>
<tr>
<td>Florida</td>
<td>54.3</td>
<td>Not available</td>
</tr>
<tr>
<td>Georgia</td>
<td>37.1</td>
<td>18.1</td>
</tr>
<tr>
<td>Idaho</td>
<td>57.4</td>
<td>19.9</td>
</tr>
<tr>
<td>Indiana</td>
<td>46.4</td>
<td>12.4</td>
</tr>
<tr>
<td>Louisiana</td>
<td>63.1</td>
<td>20.0</td>
</tr>
<tr>
<td>Maryland</td>
<td>60.5</td>
<td>24.9</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>61.7</td>
<td>26.6</td>
</tr>
<tr>
<td>Minnesota</td>
<td>40.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Mississippi</td>
<td>42.9</td>
<td>21.4</td>
</tr>
<tr>
<td>Nevada</td>
<td>41.6</td>
<td>29.1</td>
</tr>
<tr>
<td>New Jersey</td>
<td>Not available</td>
<td>Not available</td>
</tr>
<tr>
<td>New Mexico</td>
<td>47.0 *</td>
<td>Not available</td>
</tr>
<tr>
<td>New York</td>
<td>50.0</td>
<td>14.0</td>
</tr>
<tr>
<td>Ohio</td>
<td>58.5</td>
<td>25.0</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>59.6</td>
<td>28.6</td>
</tr>
<tr>
<td>Oregon</td>
<td>51.6</td>
<td>11.5</td>
</tr>
<tr>
<td>South Carolina</td>
<td>Not available</td>
<td>12.0</td>
</tr>
<tr>
<td>Texas</td>
<td>51.0</td>
<td>22.5</td>
</tr>
<tr>
<td>Virginia</td>
<td>42.6</td>
<td>3.0</td>
</tr>
<tr>
<td>Washington</td>
<td>45.9</td>
<td>4.9</td>
</tr>
</tbody>
</table>

*Note.* The asterisk (*) denotes that this is a state average of all students attending institutions. Adapted from Complete College America: Remediation: Higher Education’s Bridge to Nowhere, 2012, and Achieve 2013.

There are several HSEE states whose students entering community colleges have lower remediation rates than the national average. Even though HSEE states have been
primarily categorized as having significant numbers of minority and low-income students, the chart shows that these states do not always have high remediation rates. The rates could indicate that states with these student characteristics have been graduating more students who are college ready.

In *A Nation Accountable*, published 20 years after *A Nation at Risk*, the United States had made progress only regarding increased standards and expectations, as a result of NCLB. Nearly 65% of high school graduates were taking the recommended curriculum from 1983, an increase of 15% (U.S. Department of Education [DOE], 2008). Still, about a third of high school graduates did not take a rigorous curriculum. The report further stated, “Our performance at the high school level is as alarming as it was at the time of *A Nation at Risk*, if not worse” (U.S. DOE, 2008, p. 10).

Results from the 2013 ACT administration show that only 26% of the nation’s high school graduates scored high enough to meet all four ACT College Readiness Benchmarks (ACT, 2013). Conversely, approximately 31% of high school graduates who took the ACT in 2013 did not meet any of the ACT College Readiness Benchmarks (ACT, 2013). These results indicate that the students were not academically prepared for college.

Since *A Nation at Risk* was published in 1983, there have been many initiatives to improve the quality of education including NCLB, more rigorous curriculum, standardized tests, and increased Carnegie units for graduation. At the time of the publication in 1983, states were administering MCEs (Amrein & Berliner, 2002). Consequently, *A Nation at Risk* recommended more rigorous exams. Even though 26 states now administer HSEEs, the academic gains have not been realized in 30 years as
evidenced by the rates of remedial course-taking in college. If HSEEs have had a positive impact on college readiness, one will expect to see a decline in the need for remediation from HSEE states. On the contrary, Alaska recently repealed its exit exam policy in June 2014 after ten years citing that many of the students who passed the exam placed in remedial courses in college (Staff, 2014b).

Another strategy to improve academic preparedness from 1982 to 2004 was to increase the number of credits students needed to graduate from 21.7 to 25.8 credits (NCES, 2007). Whereas the average number of credits that graduates earned increased in math and science, the number of credits earned in other subjects such as history, arts, and foreign languages also increased. By 2013, 19 states had graduation requirements that were considered “college and career ready” (Achieve, 2013). The Carnegie units in these states ranged from a low of 18 to a high of 24. Michigan required 18 credits, the least number of Carnegie units among the 19 states. Michigan required four credits in English and Algebra II demonstrating that college readiness is more about the nature of the courses as opposed to the specific number of Carnegie units required.

Since the 1970s, the publication of A Nation at Risk challenged the United States to improve the quality of education in public schools. As the nation tried to improve the rigor of the academic curriculum, several strategies were devised. Currently, the nation is still trying to improve the quality of education for all students with college and career readiness standards.

**An alternative approach to conceptualizing college readiness.** Although most researchers focus on academic factors such as grade point average and a rigorous curriculum, Conley (2010) identified four dimensions of college and career readiness in
his book *College and Career Ready*. These aspects include key cognitive strategies, key content knowledge, academic behaviors, and contextual and awareness skills, or college knowledge. Each of the four dimensions interacts with one another.

“Key cognitive strategies are patterns of intellectual behavior that lead to the development of cognitive strategies and capabilities necessary for college-level work” (Conley, 2007, p. 13). These strategies consist of problem formation, research, interpretation, communication, and precision and accuracy.

Key content knowledge in reading and writing are two critical academic skills that are necessary for student success in college. Students who do not have a firm grasp in these two areas can struggle in other academic disciplines that require the skills. Current EOCs are purported to measure critical content knowledge in language arts and math.

Several academic behaviors are essential to college readiness, according to Conley (2007). College students need to develop mastery in self-monitoring, mastering study skills, and learning time management skills.

ACT also recognizes that academic achievement is not the only critical factor in college readiness. Thus, ACT has conducted research in the last 10 years including such factors as motivation and self-regulation that are essential for college success (ACT, 2013).

ACT’s concepts of motivation and self-regulation are similar to Conley’s (2007) domain of mastering self-monitoring. Motivation refers to those personal qualities that help students to succeed in college academically by focusing their energies on goal-directed activities. Students need to put forth the effort to become academically successful. Self-regulation and self-monitoring are synonymous. They both refer to how
well students monitor, regulate, and control their behavior toward school and learning (ACT, 2013).

Lastly, students need both contextual and awareness skills to be college ready. Examples include seeking information regarding taking admissions tests, applying for financial aid, and selecting the best college.

Some of Conley’s dimensions are the type of skill sets that would not be tested on exit exams or evidenced by grade point averages. However, if college readiness encompasses more dimensions than content knowledge, students who successfully pass HSEEs may not be academically successful in college. Participation in some college preparatory activities (e.g., pre-college programs, summer bridge programs) has been shown to provide students with knowledge of several of Conley’s dimensions (AIR, 2013).

Conley (2007) and others (Barnes et al., 2010) believe that the federal mandates for a more rigorous curriculum are more about “academic preparedness” than college readiness. After more than 20 years of policies and initiatives, a large number of students are still enrolling in college unprepared. Academic preparedness focuses on curriculum, testing, standards, and content knowledge. The expanded definition of college readiness encompasses other dimensions as discussed in this section. Consequently, students can be academically prepared for college, but not necessarily “ready” to be successful in entry-level college courses because of the additional skills necessary.

**Conceptual Framework**

**Astin’s I-E-O model.** The conceptual framework that was used in this study is Astin’s Input-Environment-Output (I-E-O) model. Astin’s model is used to assess the
effectiveness of educational practices and programs on specific student outcomes. In this study, the model was used to evaluate the impact of HSEEs in preparing students for college. The I-E-O model is very versatile.

[It seems] applicable to almost any social or behavioral field . . . as long as the interest is in studying the development (input to output) of human beings . . . and understanding more about factors (environments) that have influenced (or might influence) that development. (Astin & Antonio, 2012, p. 22)

The I-E-O model was developed as a way of studying the impact of the educational environment on the student. It helps to explain the distinct change in students over time under different settings. The model has been often used in research studies in higher education, specifically to investigate the impact of college on students. Astin’s I-E-O model helps to provide valuable information to stakeholders, particularly educators, administrators, and policymakers on how to achieve certain desirable outcomes with students (Astin, 1993).

In the I-E-O model, information is needed on student inputs, educational environment, and outputs, or outcomes to study the impact. According to Astin,

The output or achievement of students that leave an institution is a product of the input or type of students that enter the institution. Thus, to assess what the institution contributes to the later achievements of its students, the educational researcher must first take into account the talents and other attributes of the student at the time they entered. (Astin, 1965, pp. 2-3)

The talents and other attributes of entering students are referred to as inputs. They reflect the personal qualities that students initially bring to the educational experience
Inputs are measured in terms of fixed attributes like demographic information (e.g., race, gender). They can also consist of characteristics that change over time (e.g., aspirations). This study examined several student demographic characteristics including socioeconomic status, ethnicity, gender, parent’s educational attainment, aspirations for the child, family structure (whether or not living with both parents), and native language (whether English is the student’s native language). Additionally, the research studied educational background characteristics (e.g., high school GPA, college aspirations). These variables can impact the outcome of this study. Therefore, each of the variables was controlled to measure their impact on college readiness.

According to Astin (1991), “outputs must always be evaluated in terms of inputs” (p. 17). One input measure can rarely determine an output. As such, this study examined various input measures. Astin recommended that educators have to get not only input and output data but also information about the environment so that we can more adequately understand the educational process. Environmental data helps educators understand better the students’ experiences.

Environment refers to everything that happens to a student during an educational program that might influence the outcomes being studied. “The environment refers to programs, policies, faculty, peers, and any educational experience that the student is exposed to” (Astin, 1993, p. 7). In this study, students were exposed to programs, policies, teachers, and educational experiences in high school. Environmental variables included school and state-level characteristics.

Astin (1991) identified two types of environmental measures. One environmental measure is between-institution variables that are general characteristics that pertain to the
entire school, and that might impact all students. The between-school variables in this study include enrollment, location, socioeconomic status, teacher certification, and urbanicity of the student’s high school. The second environmental measure is within-school variables, or particular individual experiences of the students. In this study within-school variables include the individual experiences of students via their participation in specialized curriculum and extra-curricular activities. Figure 1 depicts the components of Astin’s I-E-O conceptual model.

![Diagram of Astin’s Input-Environment-Output Model](image)

*Figure 1.* Diagram of Astin’s Input-Environment-Output Model. This diagram is a reflection of the conceptual model of Astin’s I-E-O model. In this model, Inputs coupled with Environment have an impact on the Outcome.

State-level characteristics include the state of each high school, whether HSEEs is a requirement, and the type of HSEE (e.g., EOC, MCE, or SBE). The HSEE policy variable is the key variable of the study. This variable examined whether students in a certain environment (i.e., state) with a particular policy (i.e., HSEE) perform differently
on college readiness skills in English, reading, and math. However, since other factors impact college readiness, some variables were controlled for in the study.

Lastly, outputs refer to the dependent variables or outcomes. The output also "refers to the student characteristics after exposure to the environment" (Astin, 1993, p. 7). In this study, college readiness was measured. This variable was measured by the number of students who enrolled in remedial English, reading, or math courses in college. This study examined the impact of HSEE by controlling for input and environmental variables given that input variables can be related to both the output and the environment. Controlling for as many of these variables allowed the researcher to minimize any bias in being able to assess accurately or determine the impact of HSEE on college readiness. Data on each of the variables (input, environmental, and output) came from ELS: 2002.

The factors impacting college readiness fit neatly in both the conceptual and theoretical framework of the study. Astin’s I-E-O model and the involvement theory are used in tandem when conducting research on the impact of an educational program. Variables such as student characteristics are controlled for to examine the impact of student involvement and the impact of HSEE on college readiness. Research has shown that certain indicators of student participation in high school activities impact student success (ACT, 2013; Fredericks & Eccles, 2006; Lipscomb, 2007; Wolf-Wendel, Ward, & Kinzie, 2009).

The HSEE studies presented earlier in this section did not use a theoretical framework. The conceptual framework for many of the studies, though not described as such, was similar to Astin’s I-E-O model. Variables that were investigated in previous research have been noted in the literature as having an impact on academic achievement.
In other words, HSEEs have been studied regarding their impact on several educational outcomes (e.g., test scores, graduation rates, college grade point average, college performance in math). College readiness has not been examined regarding enrollment in remedial courses on a national level. Some demographic, student educational background characteristics, school, and state characteristics have primarily been used in earlier studies on HSEEs. Thus, the sections below describe the variables from the literature that impact college readiness.

**Input characteristics.** Inputs are fixed attributes like demographic information that students bring to the educational experience. These demographic characteristics include gender, race and ethnicity, socioeconomic status, and educational background.

**Gender.** Even though college enrollment rates for women are higher than men, some studies show that males outperform women in various college readiness indicators. With regards to the college admissions tests, ACT and SAT, females score higher in reading whereas males score higher in math (Combs et al., 2010; Halpern, 2002; Kobrin, Sathy, & Shaw, 2007; Leahey & Guo, 2001; Long, Iatarola & Conger, 2009). Although trends have changed recently, the achievement gap in math is primarily due to females not taking as many advanced courses in math in high school (American Association of University Women [AAUW], 2004; Gallagher & Kaufman, 2005). Since 2005, more females are taking higher level math courses in high schools and achieving grades that are higher than their male counterparts. However, when National Assessment of Educational Progress (NAEP) scores are considered, males still outperform females (Long et al., 2009; Shettle et al., 2007). Regarding self-reports of remedial course-taking in the United States in 2003–2004, more females reported being enrolled in a remedial
class than males (NCES, 2013). Additionally, J. J. Lee (2011) found that more women were enrolled in remedial courses in his study on the impact of the HSEE policy.

**Race and ethnicity.** Student performance on indicators of college readiness reveals significant racial and ethnic disparities (Roderick et al., 2009). Regardless of the grade level, there are differences between White students and students of color regarding academic achievement (Braswell et al., 2001; Kuh et al., 2011). College readiness rates are lower for African-American and Hispanic students as compared to White students (Long et al., 2009).

**Socioeconomic status.** There is a positive relationship between family income, college preparation, college aspirations, and college enrollment. Students who are from families with higher incomes attend schools with more academic rigor. Students from lower income families who do not have the finances to attend college often do not enroll in college. Race, ethnicity, and gender have a profound impact on socioeconomic status (ACT, 2006; Hamrick & Stage, 2004; Kuh et al., 2011; Swail, Cabrera, Lee, & Williams, 2005).

**Family composition.** The family structure can impact college enrollment and students’ desire to pursue higher education. Marks (2006) found that students who come from families of divorced parents have lower educational aspirations than students who live with both parents and single parent households.

**Educational background.** Several educational background characteristics play a role in college readiness. These variables include grade point average and student and family educational aspirations.
Grade point average. The strongest predictor of first-year college grades is high school grades (Astin, 1993; Kuh et al., 2011; Pike & Saupe, 2002). Students who receive academic preparation in high school go on to perform well in college regardless of other background characteristics (ACT, 2005; Florida Department of Education, 2005; Martinez & Klopott, 2003). Studies show that students are more successful in completing college-level work when they maintain higher than a 3.0 GPA in high school (ACT, 2013).

Family educational background and aspirations. The educational background of parents has an impact on the educational aspirations of their children (Hamrick & Stage, 2004). However, the effect seems to be greatest for lower-income students. The influence of parental education varies by gender and race (Kuh et al., 2011). For minority and White students, having at least one college-educated parent was positively correlated with student aspirations for attending college.

Most students, regardless of race, say they will attend college, but the overwhelming majority does not. Pascarella and Terenzini (2005) showed that lower educational aspirations existed among first-generation students as compared with second-generation students. Additionally, students whose mother earned a college degree were twice as likely to desire a college degree; students whose father received a degree were three times as likely as their peers to want a college degree (McCarthy & Kuh, 2006).

Prior studies have shown that having a mother who has a college degree has more impact on daughters than sons who have fathers with a college degree (Buchmann & DiPrete, 2006; Marks, 2006). Additionally, Buchmann and DiPrete (2006) found that the father’s education was more important for the son’s college enrollment than for the
daughter’s college enrollment. These studies support the claim that the influence of the parent’s educational level varies.

**Environmental characteristics.** The environment refers to everything that the student is exposed to in his or her educational experiences. Since students are exposed to high school before college, several high school characteristics have been shown to impact academic achievement.

**School characteristics.** The school characteristics include such attributes as funding, enrollment, teacher credentials, location, and socioeconomic status.

**Funding.** There is mixed research regarding the impact of funding on student outcomes (Card & Payne, 2002; Condron & Roscigno, 2003). Most of the research on funding has been limited in that it used district-level data on spending (Condron & Roscigno, 2003; Toutkoushian & Curtis, 2005). However, the literature shows that the socioeconomic status of the school district is correlated to student outcomes (Johnson, Crosnoe, & Elder, 2001; Stewart, 2008).

**Class and school size.** It is a common belief that class and school size can impact student achievement. A smaller school size is thought to have a positive effect on academic achievement (McMillen, 2004; Rumberger & Palardy, 2005). Smaller schools provide an opportunity for students to have more individualized attention and greater opportunities for involvement in activities and with school staff. Conversely, larger schools have been associated with lower test scores (V. E. Lee & Burkam, 2003) and behavioral issues (McMillen, 2004).

**Teacher credentials.** Some studies (Kane, Rockoff, & Staiger, 2006) have questioned the validity of teacher certification. However, Clotfelter, Ladd, and Vigdor
(2007) found that a regular teaching license and a master’s degree was correlated with student achievement on exit exams in North Carolina. Also, math achievement increased when students were taught by teachers who were certified in math.

*Location.* The location of the school (e.g., rural, suburban, urban) has been shown to impact the academic outcomes of students (Rumberger & Palardy, 2005). Urban schools seem to be plagued with more issues than more affluent suburban schools regarding outdated facilities, teacher quality, dropout rates, and violence. Because of these issues, many believe that schools in urban areas have a negative impact on student achievement (Stewart, 2008).

*Socioeconomic status.* Studies have demonstrated that the socioeconomic status of a school’s student body is associated with academic progress (Johnson et al., 2001). Schools with high enrollments of students from low-income families have more adverse educational outcomes (Stewart, 2008) as compared to schools that enroll a small percentage of low-income students.

*State characteristics.* The state characteristics that can impact academic achievement include accountability in the form of testing, state standards, and graduation requirements.

Several studies have shown that states with high accountability measures have better student outcomes (Carnoy & Loeb, 2002; Hanushek & Raymond, 2005; Ou, 2009). These accountability measures include standards and state testing, such as HSEEs. Politicians and policymakers try to influence legislation for accountability measures because they believe that greater accountability is synonymous with better student performance (Carnoy et al., 2003).
**Astin’s involvement theory.** The theoretical framework for this study is Astin’s student involvement theory. This theory was developed to help researchers and college administrators to develop campus environments that promote student learning. According to this theory, involvement is defined as “the amount of physical and psychological energy that the student devotes to the academic experience” (Astin, 1984, p. 518). Involvement can be academic as well as social. It also relates to the energy and time that students spend on extracurricular activities. The underlying principle behind the theory is that students who are more involved tend to do better academically.

Though the involvement theory was developed for college environments, its fundamental premise applies to other educational settings, particularly high schools. In response to concerns regarding the application of the theory to traditional college students, Astin stated “Older students are probably affected by somewhat different forms of involvement, but I don’t see involvement as not being equally relevant to students of all ages” (Wolf-Wendel et al., 2009, p. 412).

The term “involvement” is used interchangeably with engagement in K–12 settings. “Student engagement in academic work is the psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote” (Newmann, 1992, p. 12). Academic involvement is more influential than other types of involvement (Astin, 1993; Wolf-Wendel et al., 2009). ACT has even conducted research on “social engagement.” This construct characterizes interpersonal factors that influence students’ successful integration into their environment and involves participation and engagement in
extracurricular activities (ACT, 2013). Thus, it is important to study student involvement before college enrollment.

Involvement measures can aid researchers in finding out how and why environmental variables affected student outcomes (Astin, 1993). As such, this study looked at various indicators of student involvement in high schools such as courses, academic involvement (e.g., hours spent on homework, participation in academic programs, academic clubs), and non-academic involvement (e.g., involvement in sports, music). The literature reviewed research on the impact of these variables on student achievement.

Astin’s I-E-O model and the involvement theory are used when conducting research on the effects of an educational program. According to Astin, “the advent of involvement theory led to the elaboration of the I-E-O model to include ‘involvement’ (also called intermediate outcomes) as an additional construct situated between Environment and Outcome” (Wolf-Wendel et al., 2009, p. 411).

At least two major propositions guide the involvement theory. First, “the amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program (Astin, 1984, p. 519). Second, “the effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement” (Astin, 1984, p. 519). According to Astin, researchers seek out to test the two major propositions (Astin, 1984). This study examined whether participation or involvement in various student activities supports student learning defined as college readiness.
According to Astin, researchers need to know how educational policies or practices influence student involvement. Policies and practices can play a role in the way in which students spend their time and energy in educational endeavors (Astin, 1984). This study examined the impact of the educational policy of HSEEs. The next section provides a review of the literature of specific involvement variables that can impact college readiness, the outcome of the study.

**Academic course-taking.** According to ACT (2013), most high school students will meet the college readiness benchmarks if they take four years of rigorous English courses, and three years each of rigorous mathematics, science, and social studies. Additionally, students who meet the English and math benchmarks on the ACT are less likely to take remedial courses (ACT, 2013). Enrolling in Algebra I in the eighth-grade is perceived as a milestone for college preparation (AIR, 2013). Adelman (2006) found that taking a high-level math class in high school (Algebra II, pre-calculus, trigonometry, and calculus) is the best predictor of how well students will perform in college. Lastly, high school academic rigor is more influential than race, family income, or the educational attainment level of the parents on college readiness (Adelman, 2006).

Several studies have also shown the benefit of taking additional math classes beyond Algebra II (Adelman, 2006; ACT, 2005). Long et al. (2009) asserted that about one-third of the nation’s college freshmen are unprepared for college-level math. These authors studied math remediation in Florida’s public postsecondary institutions. They found that at least 28–35% of the gaps in college readiness were determined by the highest math courses that students took while they were in high school.
Research from two Utah school districts showed that students who took higher level math courses had less need for remedial courses in college (Hoyt & Sorenson, 2001). However, several students who took and passed the math courses in high school still placed in remedial courses. The limitation of the study is that it did not control for prior academic achievement.

Though it is commonly believed that taking advanced courses in high school helps students become college-ready, conflicting results were found in a study of Texas public high school students (Dougherty, Mellor, & Jian, 2006). Low-income and minority students who took AP courses failed both the AP exams and state exit exams at higher rates than White students from a higher socioeconomic status. This finding was explained by the lack of rigor and content of the AP curriculum in some low-income public schools.

Similarly, Chicago Public Schools instituted a universal policy of college preparatory coursework whereby entering ninth grade students in 1997 had to enroll in Algebra I and English I while all remedial courses in those subjects were eliminated. In a study of the policy (Allensworth, Nomi, Montgomery, & Lee, 2009), researchers found that grades, test scores, graduation rates, nor college enrollment increased. Whereas grades in English I were unaffected, students with low ability in math failed Algebra I at a rate of 50%. However, enrollment in a four-year college slightly decreased for students except for the lower performing students.

One of the main reasons that may have contributed to the outcomes was that the school district focused on course content instead of pedagogy. Additionally, changes had
not been mandated in the earlier grades; therefore many students were not ready for the academic rigor of Algebra I and English 1.

The previous two studies demonstrate that a rigorous curriculum is more than a prescribed number of courses. Both the nature and quality of the courses make a difference (Conley, 2007). If students attend schools with educators who have low expectations and standards, the course titles will not impact student success.

There are several types of advanced courses including Advanced Placement (AP) and dual enrollment. Students participating in AP or dual enrollment have an opportunity to receive college credits while in high school. Consequently, even students who do not perform well academically have been known to improve college enrollment and college success rates if they participate in some form of college experience in high school (AIR, 2013; U.S. DOE, 2011, p. 10). In some schools, the course offerings are often limited based on the percentage of minority students enrolled (Planty, Provasnik, & Daniel, 2007). So, while an academically rigorous curriculum has been associated with college readiness, some students are not afforded these opportunities based on which schools they attend.

*Parental involvement.* Especially for minority populations, students earn better grades when their parents, families, and peers support and encourage them to attend college (Pathways to College Network, 2004; Tierney, Corwin & Colyar, 2004). Parental support and involvement can reduce the effects of poverty on college enrollment and completion (Chrispeels & Rivero, 2001).

Researchers studied a group of 24,599 eighth grade students who were followed into the 12th-grade using data from National Education Longitudinal Study of 1998 and
found that parental effort improved student achievement (Houtenville & Conway, 2008). Specifically, the variables that were associated with student achievement included how frequently parents discussed activities or events of interest to the child, discussed things studied in class, discussed selecting courses or programs at schools, and attended school meetings.

**Academic involvement.** There has been limited research on the impact of homework and academic achievement. Researchers have found that doing homework is positively correlated with academic achievement (Cooper, Robinson, & Patall, 2006). The research revealed a positive and statistically significant relationship between the amount of homework done and students’ academic outcomes. The relationship was strongest for high school grades as opposed to standardized tests. Time spent on homework also emerged as a factor in academic achievement. However, there is no specific number of hours that is associated with greater academic outcomes since the quality of homework is impacted by how the time is spent.

Although several researchers believe that homework is correlated to academic achievement, others disagree (Bennett & Kalish, 2006; Kohn, 2006; Kralovec & Buell, 2000). Some researchers feel that homework negatively impacts poor and minority children who may not have adequate space or assistance at home to complete their assignments. The research on the effects of homework is varied, but the majority of the findings do show a modest impact on student academic achievement.

In addition to time spent on homework, involvement in pre-collegiate activities can impact academic achievement. Several pre-college programs, particularly federally funded ones like Upward Bound, Talent Search, and GEAR-UP have goals and
objectives regarding student and program success (Contreras, 2011). As a result, these programs have numerous strategies to achieve the goals of improving high school grades and college enrollment. To that end, the programs provide tutoring, pre-college advising, and ACT/SAT preparation classes to enable students to obtain the college knowledge concept defined by Conley (2007).

**Non-academic involvement.** Students who are involved in extra-curricular activities tend to do better in school (Fredericks & Eccles, 2006; Lipscomb, 2007; Guest & Schneider, 2003) and have higher college aspirations than students who are not involved. This involvement ties the student to the school and aids in both retention and graduation. Because some of these extra-curricular activities offer scholarships, it is not surprising that participation in such activities might encourage students to enroll in college and further develop their talents.

A research study that used a national longitudinal dataset of 16,305 students (Lipscomb, 2007) found that participation in clubs was associated with academic gains in high school and higher college aspirations. Guest and Schneider (2003) also found that students who participated in activities such as drama and journalism clubs had higher levels of achievement than students who did not participate in such activities.

The Maryland longitudinal study (Fredericks & Eccles, 2006) tracked 1,480 students from seventh to 11th-grade and revealed that there were higher grade point averages and higher educational aspirations for students who participated in school clubs and sports. This study is of particular importance because unlike most of the research studies, it controlled for achievement-related motivation.
In one of the longest longitudinal studies from Michigan, a cohort of 1,800 sixth-grade students was followed until age 25. The researchers (Eccles, Barber, Stone, & Hunt, 2003) found that students who participated in team sports were more likely to have a higher GPA and attend college than students who did not participate in team sports. The same findings were found for students who were involved in other extracurricular activities (e.g., performing arts, student government, and academic clubs).

Although participation in extracurricular activities has been positively associated with academic outcomes, some studies have not shown a significant relationship between the two (Broh, 2002; Brown & Evans, 2002). In fact, there can be some disadvantages of such participation. Time spent in extracurricular activities may detract from activities such as doing homework and could have a negative impact on students’ grades.

Several studies show that participation in sports is positively correlated with increased academic grades (Darling, Caldwell, & Smith, 2005; Eitle & Eitle, 2002; Lipscomb, 2007) and educational aspirations (Darling et al., 2005; Lipscomb, 2007; Marsh & Kleitman, 2002). However, this association is not always prevalent. Rees and Sabia (2010) used a national longitudinal sample of 20,746 high school students to confirm these findings. They stated, “There is little evidence to support the claim that sports participation is positively correlated with academic performance in the causal sense” (p. 759).

Taken together, involvement in extracurricular activities, both academic and non-academic, has some impact on academic achievement. This involvement could further impact students’ preparedness for college.
Summary

Although exit exams have been administered for over 30 years, there is still limited research on the progress of one of its intended goals: college readiness. In light of the research presented in the review of the literature, it seems safe to conclude that there is insufficient data to substantiate that HSEEs have increased the academic skills of students so that they are college ready when they enter postsecondary education.

Due to the literature being limited in scope, this paper suggests that there is a need for more research on the impact of HSEEs on college readiness. HSEE policies were created and continued without any supporting data about their impact on college readiness. Additionally, the majority of the tests were not aligned with college readiness skills to accurately measure the outcome.

Much is unknown about the impact of the new assessments. However, some states have already decided to replace their current HSEEs with these new assessments. Even though the new assessments are purported to measure college and career readiness, there is no guarantee that the college readiness levels of students will increase. In the absence of data regarding the new tests, state leaders and policymakers need to exercise caution when setting future HSEE policies.

Although the primary purpose of this study is the impact of exit exams on college readiness, the review of the literature suggests that other variables influence college readiness. Policymakers and educators need to utilize data on which involvement and environmental factors affect college readiness given that they have some control of these variables.
This chapter provided an overview of the history of exit exam testing, research on exit exams, and college readiness. The conceptual model and theoretical framework that shaped this research study (Astin’s I-E-O and student involvement theory) were discussed. Chapter Three describes the research methodology, design, and the research questions. It also covers the conceptual and theoretical frameworks, the sample and population to be studied, the secondary data, and the data analysis used in the study.
Chapter Three

Methodology

The primary goal of this study was to explore the influence of HSEEs on college readiness. As such, this chapter describes the research methodology and design of the research study employed to address the research questions presented. The chapter also covers the conceptual and theoretical framework, the sample and population to be studied, the secondary data, and the data analysis used in the study.

Research Questions

This study sought to answer the following research questions:

1. What influence, if any, do demographic characteristics have on college readiness?
2. What influence, if any, do educational background characteristics have on college readiness?
3. What influence, if any, do school-level characteristics have on college readiness?
4. What influence, if any, do HSEEs have on college readiness?
5. What influence, if any, do student involvement characteristics have on college readiness?
6. What influence, if any, do intermediate characteristics have on college readiness?
7. What influence, if any, do institutional characteristics have on college readiness?
Research Methodology

The research methodology that was employed in this study was a longitudinal quantitative, non-experimental design. The researcher was interested in examining the effects of HSEEs and other input, environmental, and institutional variables on college readiness. Secondary analysis of data was used by the researcher by obtaining a restricted data set, the Education Longitudinal Study of 2002 (ELS: 2002), from the National Center for Educational Statistics.

Secondary analysis of data. ELS: 2002 is the latest secondary school longitudinal survey sponsored by the National Center for Educational Statistics (NCES) of the Institute of Education Sciences (IES) of the United States Department of Education. The survey tracks the educational and developmental experiences of a nationally representative sample of students through high school into postsecondary education. It contains academic and demographic data about the students as well as information about their course-taking patterns and involvement at home and in school. This longitudinal data allows the researcher to explore student participation and academic preparation over time.

Students first completed the base questionnaire in spring of 2002 when they were sophomores. Questionnaires were given to parents, math and English teachers, school principals, and head librarians. The base-year student survey was completed in a group setting in the high schools and took approximately 45 minutes. A small number of students who could not take the survey during the school sessions were administered the survey outside of school using a shortened version of the questionnaire in a computer-assisted telephone interview, or CATI.
The parent questionnaire was mailed to parents’ homes. Only one parent was asked to complete the survey. There was a hardcopy version of the survey available in English and Spanish. Parents could also elect to complete the questionnaire through computer-assisted telephone interviews. NCES contracted with RTI International, a nonprofit university-affiliated research organization to conduct the base and follow-up surveys (Ingles et al., 2007).

Since the base year, a sample of students has participated in three follow-up surveys. The first follow-up survey occurred in the spring of 2004 when most of the students were seniors in high school. The sample was freshened to include seniors who were attending the base year schools. All students who were still enrolled in their base year school were administered a survey as well as students who transferred, were homeschooled, or graduated early. The first follow-up survey was administered in the same format as the base survey (e.g., in school sessions, CATI) and took approximately 45 minutes to complete. Very few surveys were completed through a mailing or a field interview. During the first follow-up, high school transcripts were received for all students regardless of whether they had transferred to another school. The information contained in the transcripts included courses completed, grades, attendance, and ACT/SAT scores.

The second follow-up survey occurred in 2006, two years after students had completed high school. The majority of the participants in the sample were in college. However, some students were employed or had never attended college. This follow-up survey was conducted in three ways: a web-based self-administered interview, a computer-assisted telephone interview, or a computer-assisted personal interview.
Participants received an incentive (approximately $20–$40 based on prior participation status) for completing the survey. A third follow-up was conducted in 2012, eight years after high school graduation. Data on college enrollment and employment histories were obtained. However, to answer the research questions in this study, data were utilized from the base survey through the second follow-up studies.

**Securing the data.** The researcher received permission for the restricted data set, ELS: 2002 First and Second Follow-ups, by obtaining a license through the Principal Project Officer (PPO), Dr. Ronald Opp, Associate Professor and Coordinator of the Higher Education Doctoral Program. Since the PPO already had a license for another NCES data set, the researcher added to the existing license by completing an “add user” amendment that was processed electronically. Then, the researcher submitted a signed, notarized Affidavit of Nondisclosure via mail to NCES. Once that amendment was approved electronically, the researcher submitted an “add data” amendment. ELS: 2002 First and Second Follow-ups were added to the existing license. Then, the PPO submitted a signed, notarized Affidavit of Nondisclosure via mail for the ELS: 2002 data to NCES. The data were mailed to the PPO after it was approved through the electronic system.

**Population and sample.** ELS: 2002 utilized a sample of sophomores in 2002 who were enrolled in high schools in the target school population. There was a total of 17,590 eligible high school sophomores. Of the eligible population, 15,360 students completed the first ELS: 2002 survey for a weighted student response rate of 87%. Also, 13,488 parents completed a parent survey.
The ELS: 2002 study utilized a two-stage sample design. The selection process began with regular public high schools, charter schools, Catholic, and private high schools in the United States that had 10th-grade students enrolled. The probability of the school’s selection was proportional to the school’s size. The schools were stratified by region, urbanicity, and school control. There were 1,220 schools selected and 750 schools that participated in the study. Approximately 30 students in the 10th-grade were randomly selected within each school based on school rosters. The final sample size is a nationally representative sample of sophomores in 2002.

The first follow-up consisted of 14,990 students out of a sample of 16,520 students for a weighted student response rate of 88.7%. The second follow-up consisted of 14,200 students out of a sample of 15,900 students for a weighted student response rate of 88%. The students who did not respond in the base year or first follow-up were not given an opportunity to participate in the second follow-up study. Additionally, some students withdrew from the study, died, or were considered incapable of participating due to a language deficiency or a physical or mental disability.

Of the students in the second follow-up, 12,770 students attended 580 different public schools. Given that exit exam policies impact public schools, only students who graduated from public schools were considered in the study. Thus, the population was 12,770 students.

In 2004, there were 19 states with HSEEs. The ELS: 2002 data set includes information on 6,080 students in HSEE states and 6,690 in non-HSEE states. Since the purpose of the study was to examine the influence of HSEEs on college readiness, the sample included all students (out of the population of 12,770) who graduated from high
school by the summer of 2004 and enrolled in college by 2006. The randomly selected sample of students from high schools nationwide allowed the researcher to generalize the results of the study to the population.

**Data analysis framework.** The data analysis framework for the study was Astin’s I-E-O model. This model was used to assess the impact of HSEEs in preparing students for college. Astin’s model used information on student inputs, educational environment, and outputs, or outcomes to study the impact of educational practices and the environment on student change.

According to Astin, inputs refer to personal qualities that students initially bring to the educational experience (Astin, 1993). Environment refers to everything that happens to a student during an educational program that might influence the outcomes being studied. Lastly, outputs refer to the dependent variables or outcomes. Variables from the review of the literature that impact college readiness were controlled for in the study. Otherwise, the results of the study might be influenced by other factors than the independent variables.

The data from ELS: 2002 were used to conduct a blocked form of stepwise regression analysis to determine which variables predicted students’ course-taking patterns—enrollment in remedial math, reading, or English courses (dependent variable). Each of the predictor variables in the study was organized into eight blocks to correspond to Astin’s I-E-O model. The different groups of variables were blocked to allow for statistical analysis of the relationships between the variables. The eight blocks included:

- Pretest
- Student demographic characteristics
- Student educational characteristics
- School characteristics
- State characteristics (HSEE variables)
- Student involvement variables (academic and nonacademic)
- Intermediate outcomes, and
- Institutional characteristics.

**Pretest (Input).** Researchers using the I-E-O model can use input data as pretests to the outcome. Pretests often have the greatest correlation to the outcome posttests as compared with other input and environmental variables (Astin & Antonio, 2012). One variable was used as a pretest:

- Ever in a remedial math class.

**Demographic information (Inputs).** This study examined six student demographic characteristics. They included socioeconomic status (family income), ethnicity, gender, parent’s educational attainment, family composition (whether or not living with both parents), and native language (whether English is the student’s native language).

A review of the literature documented the impact of socioeconomic status, ethnicity, gender, and parent’s educational attainment. Additionally, some research studies showed that ELLs were negatively affected by HSEEs (Garcia, 2003; Holme et al., 2010; Reardon et al., 2009). Therefore, the researcher included the native language of the student in the study. Lastly, the variable of family structure was included based on the literature presented on its positive impact on student academic achievement.
**Educational characteristics (Inputs).** The researcher examined three educational background characteristics. These variables included GPA in ninth grade and postsecondary aspirations of the student and parents. It is widely known that past academic achievement impacts future academic achievement. Research shows that parental aspirations for children to attend college are correlated to the parent’s educational background (Hamrick & Stage, 2004). Thus, parental aspirations have an influence on the aspirations of the children.

**School-level characteristics (Environment).** There were 10 school-level variables. Ou (2009) used similar variables to study the impact of HSEEs on various educational outcomes. The school-level variables included the following:

- School urbanicity (two dummy variables)
- Geographic region of school (three dummy variables)
- Total school enrollment in 2001/2002
- Percentage of minority students
- Percentage of students receiving free or reduced lunch
- Number of full-time teachers (FTE), and
- Number of full-time teachers whose highest degree is a master’s.

This study used the percentage of racial minority students and the percentage of students receiving free or reduced lunch as a gauge for the socioeconomic status of the schools. Additionally, this study used the number of full-time teachers and the number of full-time teachers whose highest degree is a master’s to gauge school funding (resources).

**State-level characteristics (Environment).** The HSEE policy variable (Competency test is required for Class of 2004) was the primary independent variable.
Depending on the study (Dee & Jacob, 2006; Greene & Winters, 2004; Warren et al., 2006), there is inconsistent information on the year that the state HSEE policy took effect. Similar to Ou (2009), the researcher used the information from the Center on Educational Policy exit exam report from 2007. Additional state-level variables included the type of HSEE:

- End-of-course exam
- Standards-based exam, and
- Minimum competency exam.

**Involvement variables.** Involvement variables represented the largest group of variables. The 24 variables consisted of two different types of involvement: academic involvement variables (course-taking patterns in high school, participation in homework, participation in academic clubs, parental involvement), and nonacademic variables (participation in non-academic clubs, participation in sports).

Involvement variables represent the educational experiences that students are exposed to in their environment. Thus, the I-E-O model is aimed at measuring the impact of the environment. “The theory of student development encourages educators to focus less on what they do and more on what the student does: how motivated the student is and how much time and energy the student devotes to the learning process” (Astin, 1984, p. 522). As such, many involvement variables that impact college readiness or academic achievement were selected. The variables measured both time and energy (e.g., hours/week spent on homework out of school).

Whereas previous studies on HSEEs have examined student achievement, no studies have examined involvement variables beyond course-taking patterns in
relationship to college readiness. The review of the literature section provided research on the impact of various types of involvement on student academic achievement.

*Academic involvement variables*

- Ever in Advanced Placement program
- Ever in English as a Second Language program
- Ever in a program to help prepare for college

*Participation in homework*

- Hours/week spent on homework out of school
- Hours/week spent on math homework out of school
- Hours/week spent on reading outside of school

*Participation in academic clubs and pre-collegiate activities*

- Participated in school academic clubs
- Participated in academic honor society
- Participated in a career academy
- Participated in a college program for the disadvantaged

*Parental involvement*

- How often parents check homework
- How often discussed prep for ACT/SAT with parents
- How often discussed going to college with parents

*Participation in non-academic clubs/ sports*

- Participation in school band or chorus
- Participation in cheerleading
- Participated in school play or musical
• Participated in school yearbook or newspaper
• Participation in student government
• Participated in a team sport (baseball, basketball, football, soccer, softball), and
• Participated in a solo sport.

Intermediate outcomes. Seven educational outcomes did not fit in the other blocks. However, based on the review of the literature, these variables could impact college readiness. Intermediate outcomes are variables that are unknown as the student entered the high school environment or had initial exposure to the environment (Astin & Antonio, 2012). The intermediate outcomes included:

• Total Carnegie units
• High school grade point average (overall grades 9–12)
• Units in math
• Length of time between high school graduation and college entry
• Math course-taking pipeline
• Most recent ACT composite, and
• Most recent SAT composite.

Institutional characteristics. After reviewing data collected on the available variables from ELS: 2002, 11 institutional characteristics were selected. They included the following:

• Sector of institution (four dummy variables)
• Open admission policy
• Institutional selectivity (five dummy variables), and
• Whether the first postsecondary institution is out of state.

Institutional type and selectivity might impact the outcome of the study. More remedial courses are offered at two-year and four-year public colleges as compared to private institutions. Thus, these institutional characteristics were controlled for in the study.

**Outcome.** The outcome variable was college readiness. In this study, college readiness was measured by course-taking patterns—whether a student took a remedial course in English, reading, or math in college. The model in Figure 2 depicts the data analysis framework.

*Figure 2.* Diagram of the data analysis framework using Astin’s I-E-O model. The specific variables for Input and Environment are listed as well as the outcome variables for the study.
Data Analysis

The dependent variable (college readiness) in this study measured how many remedial courses a student took in English, reading, and math at the first postsecondary institution. This dependent variable was measured on an ordinal scale from 0 to 3 whereby “0” represents the highest number of remedial courses taken, and “3” represents the lowest number of remedial courses that were taken or college readiness.

The independent variables were the input, environmental, involvement, and institutional characteristics in the study. They included continuous, ordinal, and categorical variables. All of the categorical variables were converted to dummy variables.

The statistical test used in this research study was regression analysis. Regression analysis was used to examine whether individual independent variables predicted students’ college readiness as defined by the dependent variable. The basis of regression analysis is to determine whether there is a correlation between the independent and dependent variables. As such, the researcher examined the correlations between each independent and dependent variable before running the regression analysis.

Specifically, the study employed blocked stepwise regression analysis. Using this method, the researcher controlled for input, environmental, and involvement variable effects and determined whether these variables, in addition to the primary variable, HSEE policy, added to the prediction of the dependent variable, or college readiness. Since the researcher used Astin’s I-E-O model, the statistical analysis is fitting. According to Astin and Sax (1998), “the most versatile method for implementing the I-E-O model is with blocked stepwise regression analysis” (p. 252).
In stepwise multiple regression, variables enter the analysis based on their contribution to the dependent variable. At each step in the regression model, new predictor variables are added. Another significance test is done to assess whether the previously selected predictor variables still contribute to the model. The variables that contribute the least are removed. The process continues until none of the variables meet the criteria to either enter or be removed (Hinkle, Wiersma, & Jurs, 2003).

In stepwise multiple regression, a computer algorithm, not the researcher, determines the order of entry of the independent variables. Variables are entered and removed solely based on statistical criteria. Using stepwise multiple regression results in yielding “the model that best fits the sample data” (Newton & Rudestam, 1999, p. 254).

For this study, it was important for the researcher to determine whether the HSEE variable was significant. However, since other variables could impact college readiness, stepwise regression analysis allowed the researcher to determine which ones had the greatest influence on the dependent variable. Also, this statistical method allowed the researcher to examine how each block or set of independent variables affected the dependent variable. Determining which variables contribute the most to the model will provide valuable information that can enable educators and policymakers to construct high school environments that best facilitate college readiness skills.

Since the ELS: 2002 survey data collection process employed a complex, two-stage sampling design, the SPSS Complex Samples module was also used with the corresponding sample weights. However, stepwise multiple regression could not be performed using the Complex Samples module. As a result, the Complex Samples module was used to run frequencies, descriptives, and regression using the general linear
model. The results of each statistical test using the Complex Samples module was compared with the results using basic SPSS. The detailed analysis of each predictor variable in the final model comes from the output of the stepwise regression model.

**Limitations of the Study**

Researchers have to be cognizant of internal and external validity threats for any research design. The goal of the researcher is to list the limitations of the design and carefully to explain how, in some cases, the researcher has minimized the threats. The subsequent sections address the limitations of the study.

**Threats to internal validity.** A threat to internal validity can occur when there are explanations, other than the independent variables, for the observed differences on the dependent variable (Onwuegbuzie, 2000). In the current study, the researcher selected the independent variables that were used. Thus, there could be differences in college readiness that are explained by other variables than the ones chosen for the study. The researcher minimized the threat to this validity by including variables that were supported by the review of the literature. Because ELS: 2002 is a longitudinal study that covers a timeframe of 2002–2006, there could be a threat due to history if events that were unrelated to college readiness occurred during the study and impacted students’ responses to the survey questions.

**Threats to external validity.** External validity of a research design refers to whether the findings of the study can be generalized from the sample to the target population and over time (Onwuegbuzie, 2000). An external validity threat is minimized by selecting a representative sample. The ELS: 2002 dataset contains a nationally representative sample of high school students. However, since the students represent the
cohort of 10th-grade students from spring 2002 who graduated in 2004, the findings of the study are generalizable only to that population. Also, an external threat can be minimized by achieving a high response rate. The response rate for each wave of the survey (base to Second Follow-up) was over 85%, a relatively high response rate. Thus, the threats to the external validity of the research design have been minimized.

**Limitations of secondary data.** ELS: 2002 represents secondary data. The data is a nationally representative weighted sample of 3,355,130 high school students. The primary purpose of ELS: 2002 was to examine student’s educational experiences in high school, college enrollment, college graduation, and entry into the workplace. Even though the focus of the researcher is to examine the impact of HSEEs, the dataset contains the information to answer the research questions.

There are, however, two main limitations to using ELS: 2002. First, the data is outdated by nine years since the students enrolled in college by 2006. Although the timeframe needs to be acknowledged as a limitation, the dataset contains the most current comprehensive information available to answer the questions posed by the researcher. Second, the student survey was conducted in various formats including in-person school sessions, web-based self-administered, computer assisted-telephone interview, and computer-assisted personal interview through the different waves of the interviews. The different format types might have contributed to slight misinterpretations by the students who were interviewed, specifically if they did not have an opportunity to ask for clarifications of the questions. The research organization that was responsible for the data collection process employed individuals who were trained in interview techniques,
coding, and other quality control measures to help with the consistency of the interview process.

**Summary of Methodology**

Astin’s Input-Environment-Outcome (I-E-O) model was used in this study to address seven research questions. The primary variables of the study were discussed in relation to Astin’s I-E-O model. Since secondary analysis of data was used, the data set was described with respect to the population and sample. Lastly, the statistical test employed in the study was reviewed along with the rationale for its usage. Chapter Four discusses the results for each research question.
Chapter Four

Results

Previous research on HSEEs has examined the impact of the tests on graduation and dropout rates. However, prior studies have not looked at the effects of HSEEs on college readiness. This study examined the impact of HSEEs on college readiness as defined by enrollment in remedial math, reading, and English courses at the first postsecondary institution in which the student enrolled. In this chapter, the findings of the study, including descriptive statistics, are presented. The results are presented for each of the seven research questions.

Description of the Population and Sample

The Education Longitudinal Study (ELS: 2002) began with a survey administered in spring 2002 to a cohort of 10th-grade students. The random selection process started with schools, followed by the random selection of 10th-graders within each school. The first follow-up survey was completed in F 2004 and the second follow-up survey was completed in spring 2006. The last or third follow-up survey was completed in spring 2012. The restricted ELS: 2002 dataset, the second follow-up, included a total of 16,200 respondents comprised of the following:

- 14,100 students who responded to the base and first follow-up;
- 1,200 students who responded to base survey, but did not reply to the first follow-up survey;
- 650 students who did not reply to the base survey but responded to the first follow-up survey;
- 170 freshened students from the first follow-up; and
• 100 students who responded to the base year follow-up but were out-of-scope for the first follow-up.

Since ELS: 2002 employed a two-stage sample design; different weights were used for a more accurate analysis of the data. Specifically, panel weights and cohort flags were utilized in the analysis to capture only those sophomores in 2002 that completed the survey from the base year to the second follow-up survey. The ELS: 2002 dataset captures a weighted total of 3,355,130 students in the 10th-grade when the panel weights are applied. The unweighted total amounts to 16,200 students.

The sample for this study included 10th-grade students who completed the initial or base survey in spring 2002 (G10COHORT = 1) and completed the second follow-up survey in 2004 (F2QSTAT ≥ 1) or 14,010 students. Since the purpose of the study was to examine the influence of HSEEs on college readiness, the sample only included the 10,940 students who attended public schools (BYSCTRL = 1), graduated from high school by fall 2004 (F2H1SST ≤ 2), and enrolled in college by 2006 (F2PSSTRT ≥ 1). By using the selection criteria for this population, along with the panel weight, there was a total of 1,954,720 college students, with an unweighted count of 7,060 students. Table 4 shows some selected characteristics of the ELS: 2002 overall sample contained in the dataset, and the population under study.
Table 4

*Characteristics of the ELS: 2002 Sample and the Population Under Study*

<table>
<thead>
<tr>
<th></th>
<th>Overall dataset</th>
<th>Population under study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n = 3,355,130 )</td>
<td>( n = 1,954,720 )</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

**Gender**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>1,685,140</td>
<td>1,067,880</td>
</tr>
<tr>
<td></td>
<td>50.2%</td>
<td>54.6%</td>
</tr>
<tr>
<td>Male</td>
<td>1,669,990</td>
<td>886,840</td>
</tr>
<tr>
<td></td>
<td>49.8%</td>
<td>45.4%</td>
</tr>
</tbody>
</table>

**Race**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian, Hawaiian/Pacific Islander</td>
<td>140,960</td>
<td>99,370</td>
</tr>
<tr>
<td></td>
<td>4.2%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Black/African American</td>
<td>482,350</td>
<td>252,190</td>
</tr>
<tr>
<td></td>
<td>14.4%</td>
<td>12.9%</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>33,900</td>
<td>15,320</td>
</tr>
<tr>
<td></td>
<td>1.0%</td>
<td>0.8%</td>
</tr>
<tr>
<td>White</td>
<td>2,003,700</td>
<td>1,256,070</td>
</tr>
<tr>
<td></td>
<td>59.7%</td>
<td>64.3%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>541,160</td>
<td>255,900</td>
</tr>
<tr>
<td></td>
<td>16.2%</td>
<td>13.1%</td>
</tr>
<tr>
<td>Other</td>
<td>153,060</td>
<td>75,880</td>
</tr>
<tr>
<td></td>
<td>4.6%</td>
<td>3.9%</td>
</tr>
</tbody>
</table>

**Geographic region**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>621,630</td>
<td>379,900</td>
</tr>
<tr>
<td></td>
<td>18.5%</td>
<td>19.4%</td>
</tr>
<tr>
<td>Midwest</td>
<td>815,790</td>
<td>504,360</td>
</tr>
<tr>
<td></td>
<td>24.3%</td>
<td>25.8%</td>
</tr>
<tr>
<td>South</td>
<td>1,155,040</td>
<td>635,510</td>
</tr>
<tr>
<td></td>
<td>34.4%</td>
<td>32.5%</td>
</tr>
<tr>
<td>West</td>
<td>762,670</td>
<td>434,950</td>
</tr>
<tr>
<td></td>
<td>22.7%</td>
<td>22.3%</td>
</tr>
<tr>
<td>High school GPA ≥ 2.5</td>
<td>1,830,490</td>
<td>1,228,660</td>
</tr>
<tr>
<td></td>
<td>54.5%</td>
<td>62.8%</td>
</tr>
<tr>
<td>Parents have college degree</td>
<td>1,544,250</td>
<td>1,091,630</td>
</tr>
<tr>
<td></td>
<td>45.9%</td>
<td>55.8%</td>
</tr>
</tbody>
</table>

*(table continues)*
Table 4 (continued)

*Characteristics of the ELS 2002 Sample and the Population Under Study*

<table>
<thead>
<tr>
<th></th>
<th>Overall dataset</th>
<th>Population under study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n = 3,355,130 )</td>
<td>( n = 1,954,720 )</td>
</tr>
<tr>
<td>Level of offering of institution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four or more years</td>
<td>1,352,230</td>
<td>1,132,710</td>
</tr>
<tr>
<td></td>
<td>40.3%</td>
<td>57.9%</td>
</tr>
<tr>
<td>At least 2, but less than 4 years</td>
<td>911,770</td>
<td>765,900</td>
</tr>
<tr>
<td></td>
<td>27.2%</td>
<td>39.2%</td>
</tr>
<tr>
<td>Less than 2 years</td>
<td>79,800</td>
<td>53,230</td>
</tr>
<tr>
<td></td>
<td>2.4%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Took remedial course at first postsecondary institution</td>
<td>936,580</td>
<td>770,400</td>
</tr>
<tr>
<td></td>
<td>27.9%</td>
<td>39.4%</td>
</tr>
<tr>
<td>Took no remedial course at First postsecondary institution</td>
<td>2,321,750</td>
<td>1,173,810</td>
</tr>
<tr>
<td></td>
<td>69.2%</td>
<td>60.1%</td>
</tr>
<tr>
<td>HSEE requirement for state</td>
<td>1,357,760</td>
<td>992,580</td>
</tr>
<tr>
<td></td>
<td>40.5%</td>
<td>50.8%</td>
</tr>
</tbody>
</table>

Table 4 shows that the sample is characteristic of the national representative population. The population under study is 54.6% female and White (64.3%), as compared to the overall sample population, whose percentages are 50.2% and 59.7%, respectively. In contrast to the population under study, the percentage of males is roughly the same as the percentage of females, 49.8% to 50.2% in the overall dataset.

The percentage of each of the ethnic identities in the overall dataset is larger than the population under study, except for White, Asian, and Hawaiian/Pacific Islander students. Although the majority of the students live in the South (32.5%), the population
under study has a slightly higher representation of students from the Northeast (19.4% vs. 18.5%) and Midwest (25.8% vs. 24.3%) than the overall population.

More students in the population under study have a grade point average of 2.5 or above than the overall population (62.8 % vs. 54.5%). Also, the percentage of parents with a college degree is higher in the population under study, as compared to the overall population (55.8% vs. 45.9%). About half of the students in the population under study come from states with high school exit exams (50.8%), as compared to the overall population (40.5%).

Regarding college enrollment factors, 57.9% of the students in the population under study attended a four-year institution, as compared to 40.3% of the overall population. As students entered the first postsecondary institution, far more of the students in the population under study enrolled in remedial classes (39.4%), as compared to students in the overall population (27.9%).

In summary, the average sophomore in the study was White, female, and lived in the South. The average grade point average was above 2.5, and one or more of the students’ parents had a college degree. The student had roughly a 50% chance of being from a state with a high school exit exam. Finally, the average sophomore enrolled in a four-year postsecondary institution but did not enroll in a remedial course at that institution.

**Review of the Research Questions**

The research questions in this study examined the impact of high school exit exams on college readiness for a nationally representative cohort of sophomores from 2002 who enrolled in college by 2006. The college readiness variable was compiled by
adding the values of three dichotomous variables that were measured on a scale of yes/no. The three variables were: ever enrolled in a remedial math class, ever enrolled in a remedial reading class, and ever enrolled in a remedial English class. A “yes” response was assigned a value of “1” and counted within the cases to compile the variable called remediation. The remediation variable was measured on a scale of 0 to 3 reflecting from lowest to highest the number of remedial courses that students enrolled in during their first year at the postsecondary institution.

Since the outcome under study was college readiness, the remediation variable was recoded and renamed to college readiness. The ordinal scale was then flipped such that 0 to 3 reflects from lowest to highest the absence of enrollment in remedial courses. Zero (0) represents enrollment in three remedial courses; one (1) represents enrollment in two remedial courses; two (2) represents enrollment in one remedial course; three (3) represents enrollment in none of the remedial courses. The research questions posed by this study were:

1. What influence, if any, do demographic characteristics have on college readiness?
2. What influence, if any, do educational background characteristics have on college readiness?
3. What influence, if any, do school-level characteristics have on college readiness?
4. What influence, if any, do HSEEs have on college readiness?
5. What influence, if any, do student involvement characteristics have on college readiness?
6. What influence, if any, do intermediate characteristics have on college readiness?

7. What influence, if any, do institutional characteristics have on college readiness?

Statistical Procedures

The data analysis plan was reviewed in Chapter Three. The subsequent sections describe the data analysis plan used for the ELS: 2002 dataset to answer the research questions.

Data preparation. Dr. Ronald Opp, the Principal Project Officer (PPO), received the disc that contained the data via mail from the Institute of Educational Sciences (IES) of The National Center for Educational Statistics (NCES). NCES had undergone a process of data cleaning for ELS: 2002 so that the data were prepared for analysis. After receiving the disc, the PPO contacted IES to obtain the pass phrases (i.e., passcodes) that were needed to download the data files that were in secured zipped files. The variables were downloaded into the Statistical Package for the Social Sciences (SPSS) computer statistics program from the Electronic Codebook (ECB). The ECB was contained in the data files on the disc.

A total of 81 variables was selected for inclusion in the data analysis based on their relationship with college readiness as indicated in the review of the literature. Several scale variables had already been coded for use with regression analysis as part of the data cleaning. Positive responses were assigned the largest numerical values (e.g., 1, 2) while negative responses were assigned the smallest numerical values (e.g., -4, -6). Additionally, some of the variables had already been dummy coded into dichotomous
variables to make it easier for the researcher to interpret the results. Lastly, NCES had already reviewed the data and made the necessary corrections or deletions of inaccurate and incomplete records before it was released. NCES validated each of the student responses mainly through student records data obtained from the high schools. NCES handled much of the missing data with imputation.

**Testing assumptions.** The researcher tested two statistical assumptions before analyzing the data. The first assumption is whether there is a linear relationship between the dependent variable and each of the independent variables. Thus, a two-tailed Pearson correlation was used to examine the strength of the linear relationship. Based on the Pearson correlation tests, all of the 81 variables were significant at the $p < .01$ level.

The second assumption is that there is a lack of multicollinearity in the predictors. The test of multicollinearity ensures that none of the predictor variables are redundant or contain the same information about the dependent variable. When variables are redundant, there is a possibility that the size of the beta coefficients might be small. This size could cause researchers to question the significance of the predictor variables (Astin & Antonio, 2012). The Pearson bivariate correlation was analyzed to see if any two of the variables were correlated at .90 or higher. Ten variables were removed from the list and not included in the regression analysis.

Additionally, there were two theoretical assumptions made in the analysis. The first assumption is that the data in the ELS: 2002 dataset represent the population of interest. The second assumption is that the data are both valid and reliable.

The ELS: 2002 dataset focused on sophomores in high schools and their progression to college and beyond. The focus of the study was not on high school exit
exams but did address college enrollment and course-taking patterns. Additionally, the data are representative of the graduating class of 2004. Though these are two limitations, the dataset does contain the most recent longitudinal data for the researcher to examine the questions in the study.

The ELS: 2002 study provides self-reported data through mailed surveys, telephone interviews, and web-based interviews. These different collection strategies could cause students to report false information and omit answers to certain survey questions. RTI International took the necessary steps to train interviewers to use certain protocols to ensure data integrity and validity. In many cases, student records were obtained from the high schools and postsecondary institutions to validate student responses.

**Regression analysis.** To prepare all variables for analysis in the regression analysis, categorical variables were recoded as dummy variables with binary values so that the researcher could interpret the findings. A total of 71 variables were entered into the regression formula using SPSS.

A blocked form of stepwise multiple regression was run to determine the predictor variables that had the strongest relationship with the dependent variable, college readiness. The listwise deletion process was used to address any missing values. This process is the default method in SPSS and deletes the entire record if any data is missing. As stated earlier, NCES used imputation for missing data where it was appropriate. The predictor variables were grouped into eight blocks to allow for statistical analysis (refer to Figure 2 in Chapter Three). The variables were entered in the following order:

- Block One: Pretest
• Block Two: Student demographic characteristics
• Block Three: Student educational characteristics
• Block Four: School characteristics
• Block Five: State characteristics (HSEE variables)
• Block Six: Student involvement variables (academic and nonacademic)
• Block Seven: Intermediate outcomes, and
• Block Eight: Institutional characteristics.

The stepwise multiple regression procedures allow predictor variables to enter the equation if they were significant at the $p < .05$ level. Each variable would remain in the equation if its value remained at the $p < .10$ level. A total of 69 models were produced. The following two variables never entered the model: percent minority and whether the first institution is out of state. Five variables were not significant in the final model. These variables were: student is Black, school is located in the West, hours/week spent on math homework, how far in school parent wants child to go, and number of FTE teachers whose highest degree is a master’s degree. As a result, a total of 64 variables emerged as significant predictors of college readiness in the final model.

The outcomes of the multiple regression analysis are presented in Table 5. The table includes six columns: the variable name, the block that the variable was entered into the stepwise regression, the correlation between each independent variable and the dependent variable (Zero r), the step beta ($\beta$) weight for the model when each independent variable entered into the regression, the final beta ($\beta$) weight for each independent variable that was significant in the final model, and the F value for each independent variable.
### Table 5

**Significant Predictors of College Readiness**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Zero r</th>
<th>Step</th>
<th>β</th>
<th>Final Step F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever in remedial math class</td>
<td>1</td>
<td>-0.01</td>
<td>**</td>
<td>-0.01</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td>Whether English is student’s native language</td>
<td>2</td>
<td>0.10</td>
<td>**</td>
<td>0.10</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.07</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.00</td>
<td>**</td>
</tr>
<tr>
<td>Mother’s highest level of education</td>
<td>2</td>
<td>0.09</td>
<td>**</td>
<td>0.08</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.05</td>
<td>***</td>
</tr>
<tr>
<td>Student is White</td>
<td>2</td>
<td>0.07</td>
<td>**</td>
<td>0.03</td>
<td>***</td>
</tr>
<tr>
<td>Total family income</td>
<td>2</td>
<td>0.08</td>
<td>**</td>
<td>0.03</td>
<td>***</td>
</tr>
<tr>
<td>Live with guardians</td>
<td>2</td>
<td>-0.03</td>
<td>**</td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td>Student is male</td>
<td>2</td>
<td>0.02</td>
<td>**</td>
<td>0.01</td>
<td>***</td>
</tr>
<tr>
<td>Live with 2 parents</td>
<td>2</td>
<td>0.03</td>
<td>**</td>
<td>0.01</td>
<td>***</td>
</tr>
<tr>
<td>Live with parent and guardian</td>
<td>2</td>
<td>0.01</td>
<td>**</td>
<td>0.01</td>
<td>***</td>
</tr>
<tr>
<td>Live with 1 parent</td>
<td>2</td>
<td>-0.02</td>
<td>**</td>
<td>0.14</td>
<td>***</td>
</tr>
<tr>
<td>Father’s highest level of education</td>
<td>2</td>
<td>0.05</td>
<td>**</td>
<td>-0.01</td>
<td>***</td>
</tr>
<tr>
<td>How far in school student will get</td>
<td>3</td>
<td>0.06</td>
<td>**</td>
<td>0.06</td>
<td>***</td>
</tr>
<tr>
<td>GPA for 9th grade courses</td>
<td>3</td>
<td>0.04</td>
<td>**</td>
<td>0.03</td>
<td>***</td>
</tr>
<tr>
<td>School is located in South</td>
<td>4</td>
<td>0.08</td>
<td>**</td>
<td>0.07</td>
<td>***</td>
</tr>
</tbody>
</table>

*(table continues)*
### Table 5 (continued)

**Significant Predictors of College Readiness**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Zero r</th>
<th>Step</th>
<th>β</th>
<th>Final Step</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number FTE teachers 2001/2002</td>
<td>4</td>
<td>-0.03</td>
<td>**</td>
<td>-0.03</td>
<td>***</td>
<td>-0.03</td>
</tr>
<tr>
<td>School is suburban</td>
<td>4</td>
<td>0.02</td>
<td>**</td>
<td>0.02</td>
<td>***</td>
<td>0.01</td>
</tr>
<tr>
<td>School is located in Midwest</td>
<td>4</td>
<td>-0.03</td>
<td>**</td>
<td>-0.02</td>
<td>***</td>
<td>-0.01</td>
</tr>
<tr>
<td>Percent free lunch</td>
<td>4</td>
<td>-0.01</td>
<td>**</td>
<td>0.02</td>
<td>***</td>
<td>0.02</td>
</tr>
<tr>
<td>Total school enrollment</td>
<td>4</td>
<td>-0.04</td>
<td>**</td>
<td>0.03</td>
<td>***</td>
<td>0.01</td>
</tr>
<tr>
<td>School is urban</td>
<td>4</td>
<td>-0.03</td>
<td>**</td>
<td>-0.01</td>
<td>***</td>
<td>-0.02</td>
</tr>
<tr>
<td>Test required for class of 2004</td>
<td>5</td>
<td>-0.02</td>
<td>**</td>
<td>-0.03</td>
<td>***</td>
<td>-0.02</td>
</tr>
<tr>
<td>EOC is given</td>
<td>5</td>
<td>0.04</td>
<td>**</td>
<td>0.04</td>
<td>***</td>
<td>0.05</td>
</tr>
<tr>
<td>SBE is given</td>
<td>5</td>
<td>0.05</td>
<td>**</td>
<td>0.03</td>
<td>***</td>
<td>0.04</td>
</tr>
<tr>
<td>MCE is given</td>
<td>5</td>
<td>-0.03</td>
<td>**</td>
<td>-0.02</td>
<td>***</td>
<td>-0.02</td>
</tr>
<tr>
<td>Hours spent reading outside of school</td>
<td>6</td>
<td>0.06</td>
<td>**</td>
<td>0.05</td>
<td>***</td>
<td>0.05</td>
</tr>
<tr>
<td>How often discussed ACT/SAT</td>
<td>6</td>
<td>-0.01</td>
<td>**</td>
<td>-0.03</td>
<td>***</td>
<td>-0.09</td>
</tr>
<tr>
<td>How often discussed going to college</td>
<td>6</td>
<td>0.01</td>
<td>**</td>
<td>0.08</td>
<td>***</td>
<td>0.07</td>
</tr>
<tr>
<td>Ever in Advanced</td>
<td>6</td>
<td>0.02</td>
<td>**</td>
<td>0.03</td>
<td>***</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*(table continues)*
Table 5 (continued)

**Significant Predictors of College Readiness**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Zero r</th>
<th>Step</th>
<th>β</th>
<th>Final Step F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participated in cheerleading</td>
<td>6</td>
<td>-0.01 **</td>
<td>-0.04 ***</td>
<td>-0.03 ***</td>
<td>2432.01 ***</td>
</tr>
<tr>
<td>Participated in student government</td>
<td>6</td>
<td>-0.02 **</td>
<td>-0.02 ***</td>
<td>-0.05 ***</td>
<td>2382.48 ***</td>
</tr>
<tr>
<td>Participated in academic clubs</td>
<td>6</td>
<td>0.02 **</td>
<td>0.03 ***</td>
<td>0.02 ***</td>
<td>2356.90 ***</td>
</tr>
<tr>
<td>Ever in a program to prepare for college</td>
<td>6</td>
<td>0.01 **</td>
<td>-0.03 ***</td>
<td>-0.03 ***</td>
<td>2305.33 ***</td>
</tr>
<tr>
<td>Participated in softball</td>
<td>6</td>
<td>-0.01 **</td>
<td>0.04 ***</td>
<td>0.04 ***</td>
<td>2257.30 ***</td>
</tr>
<tr>
<td>Participated in baseball</td>
<td>6</td>
<td>-0.01 **</td>
<td>-0.05 ***</td>
<td>-0.05 ***</td>
<td>2216.83 ***</td>
</tr>
<tr>
<td>Participated in football</td>
<td>6</td>
<td>0.01 **</td>
<td>0.04 ***</td>
<td>0.03 ***</td>
<td>2171.74 ***</td>
</tr>
<tr>
<td>Participated in academic honor society</td>
<td>6</td>
<td>0.02 **</td>
<td>0.02 ***</td>
<td>-0.01 ***</td>
<td>2126.37 ***</td>
</tr>
<tr>
<td>Participated in soccer</td>
<td>6</td>
<td>-0.01 **</td>
<td>-0.03 ***</td>
<td>-0.04 ***</td>
<td>2081.92 ***</td>
</tr>
<tr>
<td>Participated in basketball</td>
<td>6</td>
<td>0.01 **</td>
<td>0.03 ***</td>
<td>0.03 ***</td>
<td>2041.94 ***</td>
</tr>
<tr>
<td>Participated in a college program for disadvantaged</td>
<td>6</td>
<td>0.01 **</td>
<td>-0.01 ***</td>
<td>-0.01 ***</td>
<td>2000.26 ***</td>
</tr>
<tr>
<td>Ever in ESL</td>
<td>6</td>
<td>0.01 **</td>
<td>-0.02 ***</td>
<td>-0.01 ***</td>
<td>1958.03 *** <em>(table continues)</em></td>
</tr>
</tbody>
</table>
Table 5 (continued)

*Significant Predictors of College Readiness*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Zero r</th>
<th>Step</th>
<th>β</th>
<th>Final Step F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participated in solo sport</td>
<td>6</td>
<td>-0.01</td>
<td>**</td>
<td>-0.01</td>
<td>**</td>
</tr>
<tr>
<td>Ever in career academy</td>
<td>6</td>
<td>0.01</td>
<td>**</td>
<td>0.01</td>
<td>**</td>
</tr>
<tr>
<td>Participated in band/chorus</td>
<td>6</td>
<td>0.01</td>
<td>**</td>
<td>0.01</td>
<td>**</td>
</tr>
<tr>
<td>Participated in play/musical</td>
<td>6</td>
<td>0.01</td>
<td>**</td>
<td>-0.01</td>
<td>**</td>
</tr>
<tr>
<td>How often parents check homework</td>
<td>6</td>
<td>0.02</td>
<td>**</td>
<td>0.01</td>
<td>**</td>
</tr>
<tr>
<td>Hours spent on homework outside of school</td>
<td>6</td>
<td>0.03</td>
<td>**</td>
<td>0.01</td>
<td>**</td>
</tr>
<tr>
<td>Participated in yearbook</td>
<td>6</td>
<td>0.01</td>
<td>**</td>
<td>0.01</td>
<td>**</td>
</tr>
<tr>
<td>Most recent SAT composite score</td>
<td>7</td>
<td>0.10</td>
<td>**</td>
<td>0.07</td>
<td>**</td>
</tr>
<tr>
<td>Most recent ACT composite score</td>
<td>7</td>
<td>0.07</td>
<td>**</td>
<td>0.06</td>
<td>**</td>
</tr>
<tr>
<td>Number of months between high school graduation and college entry</td>
<td>7</td>
<td>0.02</td>
<td>**</td>
<td>0.04</td>
<td>**</td>
</tr>
<tr>
<td>Math course-taking pipeline</td>
<td>7</td>
<td>0.07</td>
<td>**</td>
<td>0.05</td>
<td>**</td>
</tr>
</tbody>
</table>

*(table continues)*
Table 5 (continued)

**Significant Predictors of College Readiness**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Zero r</th>
<th>Step</th>
<th>β</th>
<th>Final Step</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Units in math</td>
<td>7</td>
<td>0.01</td>
<td>**</td>
<td>-0.22***</td>
<td>-0.15***</td>
</tr>
<tr>
<td>Total Carnegie units</td>
<td>7</td>
<td>0.01</td>
<td>**</td>
<td>-0.11***</td>
<td>-0.11***</td>
</tr>
<tr>
<td>High school grades (9-12)</td>
<td>7</td>
<td>0.06</td>
<td>**</td>
<td>0.06***</td>
<td>0.05***</td>
</tr>
<tr>
<td>Two year public</td>
<td>8</td>
<td>-0.12</td>
<td>**</td>
<td>-0.08***</td>
<td>-0.07***</td>
</tr>
<tr>
<td>Is private 2-year</td>
<td>8</td>
<td>-0.01</td>
<td>**</td>
<td>0.06***</td>
<td>0.17***</td>
</tr>
<tr>
<td>Four year public</td>
<td>8</td>
<td>0.03</td>
<td>**</td>
<td>-0.05***</td>
<td>-0.13***</td>
</tr>
<tr>
<td>Private 4-year</td>
<td>8</td>
<td>0.01</td>
<td>**</td>
<td>-0.04***</td>
<td>-0.10***</td>
</tr>
<tr>
<td>Moderately selective</td>
<td>8</td>
<td>0.04</td>
<td>**</td>
<td>0.03***</td>
<td>0.05***</td>
</tr>
<tr>
<td>Highly selective</td>
<td>8</td>
<td>0.05</td>
<td>**</td>
<td>0.02***</td>
<td>0.04***</td>
</tr>
<tr>
<td>Unclassified 2-year</td>
<td>8</td>
<td>-0.10</td>
<td>**</td>
<td>-0.07***</td>
<td>-0.09***</td>
</tr>
<tr>
<td>Inclusive 4-year</td>
<td>8</td>
<td>-0.01</td>
<td>**</td>
<td>0.02***</td>
<td>0.02***</td>
</tr>
<tr>
<td>Open admission</td>
<td>8</td>
<td>-0.06</td>
<td>**</td>
<td>-0.01***</td>
<td>-0.01***</td>
</tr>
<tr>
<td>Unclassified 4-year</td>
<td>8</td>
<td>-0.01</td>
<td>**</td>
<td>-0.01***</td>
<td>-0.01***</td>
</tr>
</tbody>
</table>

Note. *n = 7060* with a panel weighted total of 1,954,920, R² = .074, Adjusted R² = .074. *p < .05, **p < .01, ***p < .001.

Based on the results of the ANOVA analysis, the regression model was statistically significant, F (69, 1,954,650) = 2261.65, *p = .001* level. The adjusted R² or total overall explained variance in the final model was .074. The adjusted R² revealed
that 7.4% of the variance in college readiness (as measured by enrollment in a remedial reading, writing, and math class in the first postsecondary institution) was explained by the 64 independent variables that were significant in the final model.

**Pretests.** Ever in a remedial math class ($\beta = -0.02, p < .001$) emerged as a negative predictor in the final model. The result suggests that those students taking a remedial math course in high school tended to be enrolled in remedial coursework in college.

**Block two—Student demographic characteristics.** The first research question asked what influence, if any, do demographic characteristics have on college readiness. Ten predictors emerged as significant in block two of the final model. One predictor, father’s highest education ($\beta = -0.02, p < .001$), had a negative influence on college readiness. Students whose fathers had a higher level of education tended to be enrolled in remedial courses in college. Nine other attributes, whether English is the student’s native language ($\beta = .07, p < .001$), mother’s highest level of education ($\beta = .05, p < .001$), student is White ($\beta = .02, p < .001$), total family income ($\beta = .02, p < .001$), live with guardians ($\beta = .03, p < .001$), student is male ($\beta = .02, p < .001$), live with two parents ($\beta = .16, p < .001$), live with parent and a guardian ($\beta = .12, p < .001$), and live with one parent ($\beta = .11, p < .001$) were positive predictors of college readiness. Student enrollment in college-level courses increased as the characteristics of the individual variables increased.

**Block three—Student educational background characteristics.** The second research question asked what influence, if any, do educational background characteristics have on college readiness. Two predictors emerged as significant in block three of the
final model. How far in school the student wants to go ($\beta = .04, p < .001$) and grade point average for ninth-grade classes ($\beta = .04, p < .001$) were positive predictors of college readiness. These results indicate that as students aspire to a higher level of education and their grade point average increases, enrollment in college-level courses increased.

**Block four—School-level characteristics.** The third research question asked what influence, if any, do school-level characteristics have on college readiness. Seven predictors emerged as significant in block four of the final model. Number of full-time teachers ($\beta = -0.03, p < .001$), school is urban ($\beta = -0.02, p < .001$), and school is located in the Midwest ($\beta = -0.01, p < .001$) were negative predictors of college readiness. As the value of each variable increased, student enrollment in college-level courses decreased. Other attributes such as school is located in the South ($\beta = .05, p < .001$), school is suburban ($\beta = .01, p < .01$), percent free lunch ($\beta = .02, p < .001$), and total school enrollment ($\beta = .01, p < .01$) were positive predictors of college readiness. As the value of each variable increased, student enrollment in college-level courses increased.

**Block five—State-level characteristics.** The fourth research question asked what influence, if any, do HSEEs (state-level characteristics) have on college readiness. Four predictors emerged as significant in block five of the final model. The graduating class of 2004 is required to take a test for graduation ($\beta = -0.02, p < .001$) and minimum competency test (MCE) is given ($\beta = -0.021, p < .001$) were negative predictors of college readiness. These results indicate that students from states that required an HSEE, particularly students from states that administered MCEs, tended to be enrolled in remedial courses in college. Other attributes, such as end-of-course exam (EOC) is given
(β = .05, p < .001) and standard-based exam (SBE) is given (β = .04, p < .001) were positive predictors of college readiness. These results imply that students from states that administered more rigorous HSEEs (SBEs and EOCs) tended to be enrolled in college-level courses.

**Block six—Student involvement characteristics.** The fifth research question asked what influence, if any, do student involvement characteristics have on college readiness. Twenty-two predictors emerged as significant in block six of the final model. Ever in Advanced Placement (β = .05, p < .001), participated in academic clubs (β = .02, p < .001), hours spent on homework outside of school (β = .02, p < .001), hours spent on reading outside of school (β = .05, p < .001), participated in basketball (β = .03, p < .001), participated in band/chorus (β = .03, p < .001), participated in football (β = .03, p < .001), participated in softball (β = .04, p < .001), participated in yearbook (β = .01, p < .001), how often discussed going to college with parents (β = .07, p < .001), how often parents check homework (β = .02, p < .001), and ever in career academy (β = .01, p < .001) were positive predictors of college readiness. As the value of each variable increased, student enrollment in college-level courses increased. Other attributes such as ever in ESL (β = -.01, p < .001), participated in play/musical (β = -.01, p < .001), participated in baseball (β = -.05, p < .001), participated in solo sport (β = -.02, p < .001), participated in student government (β = -.05, p < .001), how often discussed ACT/SAT with parents (β = -.09, p < .001), participated in soccer (β = -.04, p < .001), participated in a program to prepare for college (β = -.03, p < .001), participated in a college program for disadvantaged students (β = -.01, p < .001), and participated in cheerleading (β = -.03, p < .001) were
negative predictors of college readiness. These results mean that as the value of each variable increased, student enrollment in college-level courses decreased.

**Block seven—Intermediate characteristics.** The sixth research question asked what influence, if any, do intermediate characteristics have on college readiness. Seven predictors emerged as significant in block seven of the final model. Most recent SAT composite score ($\beta = .04, p < .001$), most recent ACT composite score ($\beta = .04, p < .001$), number of months between high school graduation and college entry ($\beta = .05, p < .001$), math course-taking pipeline ($\beta = .21, p < .001$), and grade point average for 9–12th grades ($\beta = .05, p < .001$) were positive predictors of college readiness. These results mean that as the characteristics of the variables increased, student enrollment in college-level courses increased. Other attributes, such as units in math ($\beta = -.15, p < .001$) and total Carnegie units ($\beta = -.11, p < .001$) were negative predictors of college readiness. These results indicate that as the units in math and Carnegie units increased, student enrollment in college-level courses decreased.

**Block eight—Institutional characteristics.** The seventh research question asked what influence, if any, do institutional characteristics have on college readiness. Ten predictors emerged as significant in block eight of the final model. Institution is private two-year ($\beta = .17, p < .001$), moderately selective ($\beta = .05, p < .001$), highly selective ($\beta = .04, p < .001$), and inclusive four-year institution ($\beta = .02, p < .001$) were positive predictors of college readiness. These results suggest that as the characteristics of these specific variables increased, student enrollment in college-level courses increased. Other attributes such as institution has open admission policy ($\beta = -.01, p < .001$), private four-year ($\beta = -.10, p < .001$), two-year public ($\beta = -.07, p < .001$), four-year public ($\beta = -.13,$
unclassified two-year institution ($\beta = -0.09, p < .001$), and unclassified four-year institution ($\beta = -0.01, p < .01$) were negative predictors of college readiness. These results indicate that as the value of each variable increased, student enrollment in college-level courses decreased.

Results with SPSS Complex Samples module. SPSS Complex Samples add-on module was used in addition to the basic SPSS package because the sampling method for ELS: 2002 did not use a simple random selection process. Therefore, the panel weight (F2BYWT) had to be applied along with the strata (STRAT ID) and cluster (PSU ID) weights to run frequencies, descriptive statistics, and the regression model. The basic SPSS package and the Complex samples yielded the same results for both the frequencies and descriptive statistics. Stepwise multiple regression cannot be performed using the Complex samples add-on module. However, the explained variance (adjusted $R^2 = .074$) was the same for the linear regression test using the Complex Samples module and the stepwise multiple regression test using basic SPSS.

Summary

This chapter provided a summary of the outcomes of the data analysis for each of the research questions. A blocked form of stepwise regression analysis was conducted to examine which demographic, educational background, school, state-level, involvement, and institutional variables were significant in predicting college readiness (defined by students’ enrollment in remedial courses at the first postsecondary institution).

A total of 71 variables entered the regression analysis. There were 69 models generated with 64 variables emerging as significant in the final model. The adjusted $R^2$
showed that the 64 variables explained 7.4% of the variance in enrolling in college-level courses at the first postsecondary institution.

All of the 64 variables that emerged as predictors in the final model are displayed in Table 5. Thirty-nine variables were positive predictors of college readiness. There is a positive relationship between these independent variables and enrollment in college-level courses at the first postsecondary institution. As the value of these variables increase, college readiness increases. To illustrate, students who were ever in an Advanced Placement course in high school tended to be enrolled in a college-level course in college. All of the 39 predictor variables that increase college readiness are listed in Table 6 with their corresponding final step beta-weight strength.

Table 6

*Significant Predictors That Increase College Readiness in Order of Final Step Beta-Weight Strength*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Final Step β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math course-taking pipeline</td>
<td>Block 7: Intermediate</td>
<td>0.21 ***</td>
</tr>
<tr>
<td>Private two-year institution</td>
<td>Block 8: Institutional</td>
<td>0.17 ***</td>
</tr>
<tr>
<td>Live with two parents</td>
<td>Block 2: Demographic</td>
<td>0.16 ***</td>
</tr>
<tr>
<td>Live with parent and guardian</td>
<td>Block 2: Demographic</td>
<td>0.12 ***</td>
</tr>
<tr>
<td>Live with one parent</td>
<td>Block 2: Demographic</td>
<td>0.11 ***</td>
</tr>
<tr>
<td>How often discussed going to college</td>
<td>Block 6: Involvement</td>
<td>0.07 ***</td>
</tr>
</tbody>
</table>

* (table continues)
Table 6 (continued)

*Significant Predictors That Increase College Readiness in Order of Final Step Beta-Weight Strength*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Final Step $\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whether English is student’s native language</td>
<td>Block 2: Demographic</td>
<td>0.07 ***</td>
</tr>
<tr>
<td>EOC is given</td>
<td>Block 5: HSEE</td>
<td>0.05 ***</td>
</tr>
<tr>
<td>Ever in Advanced Placement</td>
<td>Block 6: Involvement</td>
<td>0.05 ***</td>
</tr>
<tr>
<td>High school grade point average 9-12th grade classes</td>
<td>Block 7: Intermediate</td>
<td>0.05 ***</td>
</tr>
<tr>
<td>Hours spent reading outside of class</td>
<td>Block 6: Involvement</td>
<td>0.05 ***</td>
</tr>
<tr>
<td>Moderately selective institution</td>
<td>Block 8: Institutional</td>
<td>0.05 ***</td>
</tr>
<tr>
<td>Mother’s highest level of education</td>
<td>Block 2: Demographic</td>
<td>0.05 ***</td>
</tr>
<tr>
<td>Number of months between high school graduation and college entry</td>
<td>Block 7: Intermediate</td>
<td>0.05 ***</td>
</tr>
<tr>
<td>School is located in South</td>
<td>Block 4: School-level</td>
<td>0.05 ***</td>
</tr>
<tr>
<td>Most recent ACT score</td>
<td>Block 7: Intermediate</td>
<td>0.04 ***</td>
</tr>
<tr>
<td>Most recent SAT score</td>
<td>Block 7: Intermediate</td>
<td>0.04 ***</td>
</tr>
<tr>
<td>Grade point average for 9th grade classes</td>
<td>Block 3: Educational</td>
<td>0.04 ***</td>
</tr>
<tr>
<td>Highly selective institution</td>
<td>Block 8: Institutional</td>
<td>0.04 ***</td>
</tr>
<tr>
<td>How far in school student will get</td>
<td>Block 3: Educational</td>
<td>0.04 ***</td>
</tr>
</tbody>
</table>

(table continues)
Table 6 (continued)

*Significant Predictors That Increase College Readiness in Order of Final Step Beta-Weight Strength*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Final Step β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participated in softball</td>
<td>Block 6: Involvement</td>
<td>0.04 ***</td>
</tr>
<tr>
<td>SBE is given</td>
<td>Block 5: HSEE</td>
<td>0.04 ***</td>
</tr>
<tr>
<td>Live with guardians</td>
<td>Block 2: Demographic</td>
<td>0.03 ***</td>
</tr>
<tr>
<td>Participated in basketball</td>
<td>Block 6: Involvement</td>
<td>0.03 ***</td>
</tr>
<tr>
<td>Participated in band/chorus</td>
<td>Block 6: Involvement</td>
<td>0.03 ***</td>
</tr>
<tr>
<td>Participated in football</td>
<td>Block 6: Involvement</td>
<td>0.03 ***</td>
</tr>
<tr>
<td>Hours spent on homework outside of school</td>
<td>Block 6: Involvement</td>
<td>0.02 ***</td>
</tr>
<tr>
<td>How often parents check homework</td>
<td>Block 6: Involvement</td>
<td>0.02 ***</td>
</tr>
<tr>
<td>Inclusive four-year</td>
<td>Block 8: Institutional</td>
<td>0.02 ***</td>
</tr>
<tr>
<td>Student is White</td>
<td>Block 2: Demographic</td>
<td>0.02 ***</td>
</tr>
<tr>
<td>Percent free lunch</td>
<td>Block 4: School-level</td>
<td>0.02 ***</td>
</tr>
<tr>
<td>Total family income</td>
<td>Block 2: Demographic</td>
<td>0.02 ***</td>
</tr>
<tr>
<td>Ever in career academy</td>
<td>Block 6: Involvement</td>
<td>0.01 ***</td>
</tr>
<tr>
<td>Participated in yearbook</td>
<td>Block 6: Involvement</td>
<td>0.01 ***</td>
</tr>
<tr>
<td>School is suburban</td>
<td>Block 4: School-level</td>
<td>0.01 ***</td>
</tr>
<tr>
<td>Total school enrollment</td>
<td>Block 4: School-level</td>
<td>0.01 ***</td>
</tr>
</tbody>
</table>

*Note. n = 7060 with a panel weighted total of 1,954,920, R² = .074, Adjusted R² = .074. *p < .05, **p < .01, ***p < .001.*
Twenty-five of the variables in the model were negative predictors of college readiness. There is a negative association between these variables and enrollment in college-level courses at the first postsecondary institution. In other words, these variables did not increase college readiness. Rather, the variables were associated with enrollment in remedial courses. As an example, students who were ever in a remedial math class tended to be enrolled in a remedial course in college. Table 7 lists each of the negative predictors and their final beta-weight strength in order.

Table 7

*Significant Predictors That Decrease College Readiness in Order of Final Step Beta-Weight Strength*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Final Step $\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units in math</td>
<td>Block 7: Intermediate</td>
<td>-0.15 ***</td>
</tr>
<tr>
<td>Four-year public institution</td>
<td>Block 7: Institutional</td>
<td>-0.13 ***</td>
</tr>
<tr>
<td>Total Carnegie units</td>
<td>Block 7: Intermediate</td>
<td>-0.11 ***</td>
</tr>
<tr>
<td>Private four-year institution</td>
<td>Block 8: Institutional</td>
<td>-0.10 ***</td>
</tr>
<tr>
<td>How often discussed ACT/SAT</td>
<td>Block 6: Involvement</td>
<td>-0.09 ***</td>
</tr>
<tr>
<td>Unclassified two-year</td>
<td>Block 8: Institutional</td>
<td>-0.09 ***</td>
</tr>
<tr>
<td>Two-year public institution</td>
<td>Block 8: Institutional</td>
<td>-0.07 ***</td>
</tr>
<tr>
<td>Participated in baseball</td>
<td>Block 6: Involvement</td>
<td>-0.05 ***</td>
</tr>
<tr>
<td>Participated in student government</td>
<td>Block 6: Involvement</td>
<td>-0.05 ***</td>
</tr>
<tr>
<td>Participated in soccer</td>
<td>Block 6: Involvement</td>
<td>-0.04 ***</td>
</tr>
</tbody>
</table>

*(table continues)*
Table 7 (continued)

*Significant Predictors That Decrease College Readiness in Order of Final Step Beta-Weight Strength*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Final Step β</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever in a program to prepare for college</td>
<td>Block 6: Involvement</td>
<td>-0.03</td>
<td>***</td>
</tr>
<tr>
<td>Number of FTE teachers 2001/2002</td>
<td>Block 4: School-level</td>
<td>-0.03</td>
<td>***</td>
</tr>
<tr>
<td>Participated in cheerleading</td>
<td>Block 6: Involvement</td>
<td>-0.03</td>
<td>***</td>
</tr>
<tr>
<td>Ever in a remedial class</td>
<td>Block 1: Pretest</td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td>Father’s highest level of education</td>
<td>Block 2: Demographic</td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td>MCE is given</td>
<td>Block 5: HSEE</td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td>Participated in solo sport</td>
<td>Block 6: Involvement</td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td>School is urban</td>
<td>Block 4: School-level</td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td>Test is required for Class of 2004</td>
<td>Block 5: HSEE</td>
<td>-0.02</td>
<td>***</td>
</tr>
<tr>
<td>Ever in ESL</td>
<td>Block 6: Involvement</td>
<td>-0.01</td>
<td>***</td>
</tr>
<tr>
<td>Participated in academic honor society</td>
<td>Block 6: Involvement</td>
<td>-0.01</td>
<td>***</td>
</tr>
<tr>
<td>Participated in a college program for disadvantaged</td>
<td>Block 6: Involvement</td>
<td>-0.01</td>
<td>***</td>
</tr>
<tr>
<td>Participated in play/musical</td>
<td>Block 6: Involvement</td>
<td>-0.01</td>
<td>***</td>
</tr>
<tr>
<td>School is located in West</td>
<td>Block 4: School-level</td>
<td>-0.01</td>
<td>***</td>
</tr>
<tr>
<td>Unclassified four-year</td>
<td>Block 8: Institutional</td>
<td>-0.01</td>
<td>**</td>
</tr>
</tbody>
</table>

*Note.* $n = 7060$ with a panel weighted total of 1,954,920, $R^2 = .074$, Adjusted $R^2 = .074$. *$p < .05$, **$p < .01$, ***$p < .001$. 

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Table 6 shows that the two most significant predictors based on their final step beta-weight strength were math course-taking pipeline ($\beta = .21, p < .001$) and private two-year institution ($\beta = .17, p < .001$). These two predictors come from the intermediate variables (Block 7) and institutional variables (Block 8) respectively. Conversely, Table 7 shows that the two weakest predictors of college readiness were school is located in the West ($\beta = -.01, p < .001$) and unclassified four-year institution ($\beta = -.01, p < .01$).

Table 8 shows the variance explained by each block of the model. The two blocks that accounted for the most variance in the dependent variable were intermediate and demographic variables (Block 7 and Bock 2). These blocks accounted for 2.1% and 2.0% of the variance, respectively. Institutional characteristics added 1.1% of the variance in the dependent variable followed by school-level characteristics (.8%), student involvement characteristics (.8%), educational characteristics (.4%), HSEE variables (.2%), and pretest (.01%).

Chapter Five provides a detailed discussion of the findings for each research question. It presents conclusions from the results as well as implications for policy and practice. Lastly, recommendations for future research are presented.
Table 8

*Variance Explained by Block for Predictors of College Readiness*

<table>
<thead>
<tr>
<th>Block Number and description</th>
<th>Variance explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block 1: Pretests</td>
<td>0.01%</td>
</tr>
<tr>
<td>Block 2: Demographic characteristics</td>
<td>2.0%</td>
</tr>
<tr>
<td>Block 3: Educational characteristics</td>
<td>0.4%</td>
</tr>
<tr>
<td>Block 4: School-level characteristics</td>
<td>0.8%</td>
</tr>
<tr>
<td>Block 5: HSEE characteristics</td>
<td>0.2%</td>
</tr>
<tr>
<td>Block 6: Student involvement characteristics</td>
<td>0.8%</td>
</tr>
<tr>
<td>Block 7: Intermediate characteristics</td>
<td>2.1%</td>
</tr>
<tr>
<td>Block 8: Institutional characteristics</td>
<td>1.1%</td>
</tr>
<tr>
<td>Total explained variance</td>
<td>7.4%</td>
</tr>
</tbody>
</table>

Note. \( n = 7060 \) with a panel weighted total of \( 1,954,920 \), \( R^2 = .074 \), Adjusted \( R^2 = .074 \). *\( p < .05 \), **\( p < .01 \), ***\( p < .001 \).
Chapter Five

Discussion, Conclusions, and Recommendations

This chapter summarizes the purpose of the study and provides a detailed discussion of the findings for each research question. Conclusions from the findings of the study are discussed in terms of how school environments might improve college readiness. Finally, implications for policy and practice and recommendations for future research are presented and reviewed.

Summary of the Study

The purpose of this study was to examine the impact of HSEEs and other variables (demographic, educational, school, involvement, and institutional) on college readiness. College readiness was defined as enrollment in remedial courses in math, reading, and English at the first postsecondary institution in which the student enrolled. The history of high school exit exams was presented in the review of the literature in addition to trends in college readiness. An overview of Astin’s conceptual framework, Input-Environment-Output (I-E-O) Model, was presented as well as factors that impact college readiness. Finally, the theoretical framework, Astin’s theory of student involvement theory, was described.

According to the review of the literature on high school exit exams, much of the previous research on HSEEs examined the impact of the tests on graduation and dropout rates. However, there were limited studies on the effects of HSEEs on college readiness (Garland et al., 2011; Jaffe, 2012; J. J. Lee, 2011; Schurdell, 2001). This particular study varies from previous studies in that it focuses on the outcome of college readiness. Also, it is a nationally representative study that is longitudinal in nature. Further, the study
utilizes a more recent dataset, the Education Longitudinal Study of 2002 (ELS: 2002), whereas prior research studies used ELS: 1988. ELS: 2002 takes into account the most recent changes in exit exams. Lastly, this study uses both a conceptual and theoretical framework. There are research studies on HSEEs that discuss some demographic and academic characteristics. However, none of the studies use Astin’s I-E-O model or Astin’s student involvement theory.

Astin’s I-E-O model was the conceptual model used to examine the research questions posed by the study. This model is used to assess the effectiveness of educational practices and programs in developing student talent. In this study, the model was used to evaluate the effectiveness of HSEEs in preparing students for college. Using the I-E-O model, inputs (I) represent entering characteristics of students. This study examined pretests, demographic, and educational characteristics. The environment (E) examined school-level and state or HSEE variables, student experiences in high school, intermediate, and institutional characteristics. Lastly, outcome (O), or college readiness, was defined as the number of remedial courses students took in the first year of postsecondary education. The input and environmental variables were selected from the review of the literature and included in the study to determine which variables influenced college readiness. Astin’s I-E-O model is particularly useful because it allows the researcher to study how the individual input and environmental variables contribute to college readiness as well as how each group of variables contributes to the outcome variable.

The theoretical framework for this study was Astin’s student involvement theory. This theory was originally developed to help researchers and college administrators
develop campus environments that promote student learning. Involvement is defined as “the amount of physical and psychological energy that the student devotes to the academic experience” (Astin, 1984, p. 518). Involvement can be academic as well as social. Involvement reflects the energy and time that students spend on extracurricular activities. The underlying principle behind the student involvement theory is that students who are more involved tend to do better academically.

The researcher used secondary analysis of data. The dataset, Education Longitudinal Study of 2002 (ELS: 2002), was secured from the Department of Education. ELS: 2002 is a nationally representative study that included a weighted number of 3,355,130 sophomores who graduated in 2004. The population under study included a weighted total of 1,954,720 students who were sophomores in 2002 and entered postsecondary education by 2006.

The Statistical Package for the Social Sciences (SPSS) was used to download the data. A total of 81 variables were selected for inclusion in the data analysis. All 81 variables had a significant linear relationship with the dependent variable. The researcher removed 10 redundant variables from the analysis. All of the categorical variables were recoded to dummy variables.

A blocked form of stepwise multiple regression was used to analyze the data. Eight blocks were used in the regression analysis to determine which predictor variables had a significant relationship with the dependent variable. Stepwise multiple regression allowed the researcher to determine whether the independent variables, in addition to the HSEE variable, added to the prediction of the dependent variable. The blocked form of
stepwise regression is fitting since it is “the most versatile method for implementing the I-E-O model” (Astin & Sax, 1998, p. 252).

In stepwise multiple regression, variables enter the analysis based on their contribution to the dependent variable. At each step of the model, new predictor variables are added. Each time a new variable is added, a significance test is repeated to assess whether the previously selected predictor variables still contribute to the model. The variables that do not have a possible contribution are removed. The process continues until there are no other variables that meet the criteria to either enter or be removed (Hinkle et al., 2003). A computer algorithm determines the order of entry of the independent variables in stepwise multiple regression. Thus, the results yield “the model that best fits the sample data” (Newton & Rudestam, 1999, p. 254) and generate the least amount of significant predictor variables.

Using the I-E-O model in tandem with the student involvement theory, the eight blocks entered the regression model. Three input blocks consisted of: (a) pretest (one variable), (b) demographic (11 variables), and (c) educational characteristics (three variables). There were five environment blocks that consisted of: (d) school characteristics (10 variables), (e) HSEE characteristics (four variables), (f) involvement characteristics (24 variables), (g) intermediate characteristics (seven variables), and (h) institutional characteristics (11 variables).

Seventy-one variables entered the regression model and were grouped into one of the eight blocks. According to the stepwise method, statistical criteria determine which variables enter and are removed. Sixty-nine models resulted from the regression analysis. A total of 64 variables emerged as significant predictors in the final model.
Discussion of the Findings

The two blocks that accounted for the most variance in the dependent variable were intermediate and demographic variables (Block 7 and Block 2). These blocks accounted for 2.1\% and 2.0\% of the variance, respectively. Institutional characteristics (Block 8), involvement (Block 6), and school-level (Block 4) characteristics were the next three blocks that accounted for the greatest amount of variance at 1.1\%, .8\%, and .8\%, respectively. The remaining variables: educational characteristics (Block 2), HSEE variables (Block 5), and pretest (Block 1) accounted for .4\%, .2\% and .01\% of the variance, respectively.

Of the 64 variables that emerged as significant predictors in the model, 39 variables were positive predictors of college readiness. These variables were associated with student enrollment in college-level courses at the first postsecondary institution. There were 25 negative predictors. These variables were associated with student enrollment in remedial courses at the first postsecondary institution.

Pretest. According to Astin and Antonio (2012), pretests often have the greatest correlation to the outcome posttests as compared with other input and environmental variables. The pretest used in this study was whether students took a remedial math course in high school. The variable was a negative predictor in the model.

Students take a remedial course in high school if they do not attain a proficiency level on the HSEE. The remedial course is designed to help improve deficient skills so that students are more successful on the next attempt of the test. It is plausible to think that students who were not successful in attaining a proficiency level on the state assessment in high school lacked certain skills needed for college. However, it is
important to note that all high schools do not offer such an intervention for its students. Though the pretest had a weak association with the dependent variable, it emerged as a predictor in the model. Thus, students who took a remedial math class in high school tended to be enrolled in a remedial course in college.

**Block two—Student demographic characteristics.** The first research question asked what influence, if any, do demographic characteristics have on college readiness. Ten predictors emerged as significant in block two of the final model. One predictor, father’s highest level of education, had a negative influence on college readiness. Nine other attributes such as whether English is the student’s native language, mother’s highest level of education, student is White, total family income, live with guardians, student is male, live with two parents, live with parent and a guardian, and live with one parent were positive predictors of college readiness. The variables in this block accounted for 2% of the explained variance in the dependent variable, making it the block with the second greatest amount of total explained variance in the model. Thus, as confirmed by Astin’s I-E-O model, demographic or entering characteristics impact the outcome variable of college readiness.

Consistent with the review of the literature, parents’ educational level, gender, income, ethnicity, predominant language spoken, and family composition impact college readiness (ACT, 2006; Braswell et al., 2001; Hamrick & Stage, 2004; Kuh et al., 2011; Long et al., 2009; Roderick et al., 2009; Swail et al., 2005). There is a positive correlation between the educational background of parents and the educational aspirations of their children (Hamrick & Stage, 2004). Students with parents that earned a degree are more likely to desire to go to college. McCarthy and Kuh (2006) found that
students whose father received a degree were three times more likely than their peers to want a college degree.

In the current research study, however, the father’s highest level of education was a negative predictor for college readiness. This variable had a relatively weak relationship with the dependent variable as compared to the other variables. This research study looked at students who entered college, not just those who had aspirations to go to college. While it is plausible to think that students who have aspirations to go to college are more likely to attend, that is not necessarily the case. In fact, most students say that they will attend college, but do not enroll (Kuh et al., 2011).

Given that the mother’s highest level of education was a positive predictor in the current study, the finding that the father’s highest level of education was a negative predictor might not be of great concern. Hamrick and Stage (2004) found that minority and White students had the predisposition to attend college if they had at least one college-educated parent.

The notion that having a mother who has a college degree has more impact on daughters than sons who have fathers with a college degree has been documented in prior studies (Buchmann & DiPrete, 2006; Marks, 2006). Buchmann and DiPrete (2006) found that the father’s education was more important for the son’s college enrollment than for the daughter’s college enrollment. Either of these notions might explain the current study’s finding that the father’s highest level of education was not a positive predictor of college readiness particularly since 55% of the students in the sample were female. Further, society holds traditional views that mothers encourage their children’s
educational pursuits by being actively involved in school-related activities; fathers are associated with parental involvement in their children’s sports activities.

There was a positive correlation between father’s highest level of education and college readiness. However, when this variable entered the regression model, the coefficient sign became negative. There is a possibility of an interaction effect with other independent variables in the model that could be suppressing or “restraining” the effect of this variable. Several plausible explanations have been provided to explain the negative finding in this study of the father’s highest level of education. However, this is an area that warrants further research.

Data show that females outperform males in reading and that males outperform females in math (Combs et al., 2010; Halpern, 2002; Kobrin et al., 2007; Leahey & Guo, 2001). The performance gap in math is perceived to be attributed to males taking more advanced math courses in high school than females (AAUW, 2004; Gallagher & Kaufman, 2005). In a 2003–2004 report on remedial course-taking in the United States, more females reported being enrolled in remedial college courses than males (NCES, 2013). It is a common notion that males are encouraged to pursue math and science areas at an earlier age than females. This encouragement is likely to lead to males developing more advanced skills in those areas. Therefore, the finding of the current study that more males tended to be enrolled in college-level courses is supported by the studies in the review of the literature.

In this study, students who come from families with higher incomes were more likely to be enrolled in college-level courses at the first postsecondary institution. Students who come from families with higher incomes have higher aspirations to attend
college and generally attend schools with more rigor than families with lower incomes (ACT, 2006; Hamrick & Stage, 2004; Kuh et al., 2011; Swail et al., 2005). Further, social economic status exacerbates the effects of race, ethnicity, and gender regarding college readiness. Thus, the finding of the study is consistent with the review of the literature.

Similarly, there are racial disparities in the level of college readiness in that White students outperform African-American and Hispanic students (Braswell et al., 2001; Kuh et al., 2011; Long et al., 2009; Roderick et al., 2009). Consistent with prior research, this study found that White students were more likely to be enrolled in college-level courses during their first year of college.

Several research studies have shown that English Language Learners (ELLs) are negatively impacted by HSEEs (Garcia, 2003; Holme et al., 2010; Reardon et al., 2009). Consistent with these studies, the current study found that whether the student’s first language was English was a positive predictor of college readiness. The finding suggests that students whose first language is not English are more likely to have a language barrier that impacts their performance in school and on HSEEs.

With respect to family composition, Marks (2006) found that students who come from families of divorced parents have lower educational aspirations than students who live with both parents and students who live in single parent households. This research study supports the finding of the predictor variable live with two parents and possibly another predictor variable, live with one parent. The family composition variable did not include whether the student’s parents were divorced, just if they lived with one or more parents or guardians. Another plausible explanation for live with a parent and a guardian
or live with guardians might be due to an interaction effect of income when both parents are employed. As discussed earlier in the section, as income levels of the parents increased, students were more likely to be enrolled in college-level courses.

It is important to note that the coefficient of the variable live with guardians shifted signs between its entry step and the final step in the model. When the variable entered the model, it decreased college readiness. However, in the last step in the model, the variable increased college readiness. There is a possibility of an interaction effect with other independent variables in the model that could be suppressing or restraining the effect of this variable. In addition, live with one parent was negatively correlated with college readiness. However, when it entered the model, it increased college readiness, again suggesting an interaction effect with other variables in the model. Several plausible explanations have been provided to explain these two variables. However, given the fact that all of the family composition dummy variables emerged as positive predictors, this is an area that warrants further study.

According to Astin, input variables are fixed because they represent characteristics that students bring to the educational experience. Therefore, educators and administrators need to be cognizant of negative predictors of college readiness so that appropriate programs and services can offset any adverse outcomes.

**Block three—Student educational background characteristics.** The second research question asked what influence, if any, do educational background characteristics have on college readiness. Two predictors emerged as significant in block three of the final model. How far in school the student wants to go and grade point average for ninth-
grade classes were positive predictors of college readiness. The variables in this block accounted for .4% of the explained variance in the dependent variable.

Consistent with this study, grade point average in high school has been noted as the greatest predictor of success in college (Astin, 1993; Kuh et al., 2011; Pike & Saupe, 2002). Thus, it is not surprising that students with a higher grade point average in ninth grade tended to be enrolled in college-level courses during their first year of college.

Though parental support is a strong factor in students desiring to go to college, students must internalize the aspiration to go to college (Pathways to College Network, 2004; Tierney et al., 2004). Students who desire to attain a college degree will be encouraged to study harder to be more successful in college. The finding that students who aspired to go farther in their education tended to be enrolled in college-level courses suggests that it takes more than parental support for students to be successful; students have to put forth the effort to attain their goals.

According to Astin’s I-E-O model, aspiration is an input variable that is not fixed. Students’ aspirations for college can change as they are exposed to the benefits of a college education, are provided sufficient support, and attain higher grade point averages.

ELS: 2002 did not include a grade point average of students from eighth grade. Therefore, the researcher was unable to establish academic achievement upon entry into high school. While some HSEEs are administered in the ninth-grade, many are taken in the 10th-grade. The finding that grade point average from ninth-grade classes was a predictor for college readiness might suggest that academic interventions before ninth grade might be more influential and that every effort should be made to improve students’ academic deficiencies before high school enrollment.
Block four—School-level characteristics. The third research question asked what influence if any, school-level characteristics have on college readiness. The school-level variables are considered between-school environmental variables according to Astin’s I-E-O model since these characteristics pertain to the entire school and might impact all students. Seven predictors emerged as significant in block four of the final model. The number of full-time teachers, school is urban, and school is located in the Midwest were negative predictors of college readiness. Other attributes such as school is located in the South, school is suburban, percent free lunch, and total school enrollment were positive predictors of college readiness. The variables in this block accounted for .8% of the explained variance in the dependent variable.

Urban schools have been associated with low teacher quality, high dropout rates, and low academic outcomes (Rumberger & Palardy, 2005). Conversely, suburban schools have been associated with high student academic outcomes (Stewart, 2008). As affirmed by the review of the literature, students attending urban schools tended to be enrolled in remedial courses while students attending suburban schools tended to be enrolled in college-level courses. These findings might suggest the need for increased funding for urban schools to improve the quality of education.

The finding of the number of FTE teachers as a negative predictor and total school enrollment as a positive predictor seem contradictory. The higher the number of full-time teachers might indicate a higher school enrollment. Typically large school enrollments negatively impact the preparedness of students (V. E. Lee & Burkam, 2003). However, the student was the unit of measurement in this study, not the school. Total school enrollment was a continuous variable in this study. Based on the frequency counts
of this variable, nearly 60% of the students in the sample attended a high school that had fewer than 1600 students. School enrollments ranged from a minimum of 42 students to a high of 4643 students with an average school size of 1492. Thus, based on this study, the sample schools had lower than average school enrollments that would typically be attributed to better student academic outcomes (McMillen, 2004; Rumberger & Palardy, 2005).

Conversely, the number of FTE teachers was a negative predictor of college readiness. As mentioned earlier, the student was the unit of measurement, not the school. The number of FTE teachers was a continuous variable that ranged from a minimum of five FTE teachers to a high of 269 FTE teachers, with a mean of 82 teachers. Based on the frequency of the FTE teacher variable, 60% of the students in the sample attended schools that had 100 full-time teachers or less which would equate to roughly a student teacher ratio of 18:1. Therefore, it was somewhat surprising that the number of FTE teachers was not correlated with college readiness.

It is important to note that there was a high correlation between number of FTE teachers and total school enrollment (.84) though the correlation was not .90 or above. These two variables might have contained similar information about the dependent variable. The coefficients of individual predictors can be impacted when variables have a high correlation. Furthermore, there was a negative correlation between total school enrollment and college readiness. However, when the variable entered the regression model, it increased college readiness. This change in the direction of the coefficient might suggest that other variables are suppressing the effect of the total school enrollment variable. More research is warranted in this area.
As evidenced by the review of the literature, schools enrolling students from a low socioeconomic status are affiliated with low academic success (Johnson et al., 2001; Stewart, 2008). This study used percentage of students receiving free or reduced lunch as a proxy to gauge socioeconomic status. Like the previous two variables discussed, percent of students receiving free or reduced lunch was a continuous variable with the student as the unit of measurement. The percentage of students receiving free or reduced lunch from the sample schools ranged from a low of 0% to a high of 96%. The average percentage of students receiving free or reduced lunch at the sample schools was 17%, a relatively small percent. Thus, roughly 80% of the students’ families did not qualify for free or reduced lunch because their income was too high. Therefore, it is not surprising that percentage of students receiving free or reduced lunch was a positive predictor of college readiness in this study.

It is important to note that percentage of students receiving free or reduced lunch was negatively correlated with college readiness. However, when the variable entered the regression model, it increased college readiness. This change in the sign of the coefficient suggests a relationship between this variable and other independent variables in the model. The relationship can cause the effect of the variable to be suppressed. Further research is warranted in this area to examine which variables might be contributing to the suppressor effect.

Minimal competency exams (MCEs) have been criticized because they are the lowest in rigor among the three types of HSEEs. Four states administered MCEs in 2004. Two of the states, Ohio and Minnesota, are located in the Midwest. The prior research supports the study’s finding that students from the Midwestern states (due to MCEs)
tended to be enrolled in remedial courses. However, it is important to note that though this variable emerged as a negative predictor, it had a weak relationship with the dependent variable.

As shown in the review of the literature, the majority of the states with HSEEs are from the South. In 2004, there were three states with EOCs. Two of the states, Mississippi and Virginia, are located in the South. Out of the 12 states with SBEs, half of them are located in the South. Both SBEs and EOCs have been shown to produce higher academic achievement levels among students than MCEs (CEP, 2008; ECS, 2010; Holme, 2013). Thus, this research supports the finding that students who come from states in the South were more likely to be enrolled in college-level courses.

In summary, many of the environmental variables in this block (e.g., geographic location, urbanicity) are fixed. Since they represent between-school variables, they impact all students. However, Astin’s I-E-O conceptual model implies that variables such as school composition (e.g., enrollment, percent free or reduced lunch) can change if administrative decisions are made to reconfigure the student population in such a way that improves the schools’ academic outcomes.

**Block five—State-level characteristics.** The fourth research question asked what influence, if any, do HSEEs have on college readiness. Four predictors emerged as significant in block five of the final model. The graduating class of 2004 is required to take a test for graduation, and minimum competency test (MCE) is given were negative predictors of college readiness. End-of-course exam (EOC) is given and standard-based exam (SBE) is given were positive predictors of college readiness. The variables in this block accounted for .2% of the explained variance in the dependent variable. This
finding suggests that while HSEEs emerged as a significant predictor, the effect was small relative to other predictors in the model. This weak relationship is consistent with Shuster’s study (2012) using the same dataset, ELS: 2002. However, her study examined the impact of high school exit exams on graduation, achievement, and dropout rates.

The research question addressed in this section is the crux of the study. This study examined whether students in a certain environment (i.e., state) who are exposed to a specific policy (i.e., HSEE) perform differently on college readiness. Based on the review of the literature, HSEEs have not had a positive impact on student academic outcomes (CEP, 2008; Grodsky et al., 2009; Holme et al., 2010; Reardon et al., 2009; Shuster, 2012; Warren & Grodsky, 2009). J. J. Lee (2011) also found that HSEE policies were associated with remediation in college. Similar to the research study, Lee used a national data set, National Longitudinal Survey of Youth of 1997, of nearly 5,000 students. Contrary to the current study, Lee only looked at placement in remedial math classes whereas the present study not only confirmed the finding but added that HSEEs were predictive of remedial placement in math, English, and reading courses. Additionally, Lee did not look at the particular type of HSEE.

Some national studies have investigated the impact of HSEEs on college readiness as defined by ACT and SAT scores. Marchant and Paulson (2005) found that students in states with HSEEs had lower SAT scores than students from non-HSEE states. Additionally, Amrein and Berliner (2002) found that student scores on both the SAT and ACT declined since the implementation of HSEEs.

The literature supports the finding of the study that the graduating class of 2004 is required to take a test for graduation was a negative predictor of college readiness.
HSEEs, however, represent high accountability measures that have been associated with high academic outcomes. This finding has significant implications for policymakers who have pushed HSEE legislation based on the belief that the high stakes tests produce high academic achievement.

Students from states with MCEs were more likely to enroll in a remedial course (Schurdell, 2001; Staff, 2014b). Conversely, students from states that administer SBEs and EOCs were more likely to enroll in college-level courses or have high first-year college grade point averages (Baisey-Jackson, 2010; Cimetta, 2012; Cimetta et al., 2010; Guerra, 2009; Hyslop, 2014; McGhee, 2013). The previous research studies support the study’s finding that MCEs were associated with remediation while SBEs and EOCs were associated with college readiness.

Consistent with the current research study, Schurdell (2001) found that the Ohio Ninth Grade Proficiency Test (ONGPT), an MCE, predicted students’ need for remediation in college. The study used regression analysis and controlled for high school grade point average, ACT scores, and gender. Unlike Schurdell’s (2001) study, this research study did not look at the number of attempts to pass the test, just whether the state had an exit exam and the type of exam administered. The implication of the current research study, though, is that the students passed the HSEE or met alternative requirements for high school graduation.

In similar fashion, Alaska, a state that administers an MCE, recently repealed the exam in June 2014 because the policymakers cited that a large number of students who passed the exams in the past 10 years placed in remedial classes in college (Staff, 2014b).
This decision supports the study’s finding that students from states with MCEs tended to be enrolled in remedial courses.

Consistent with the review of the literature, several SBEs were correlated with college readiness. Specifically, students from states that administered TAKS, AIMS, and MCAS tended to be enrolled in either college-level courses or demonstrated higher college grade point averages (Baisey-Jackson, 2010; Cimetta, 2012; Cimetta et al., 2010; Guerra, 2009; Hyslop, 2014; McGhee, 2003) than students from non-SBE states.

Baisey-Jackson’s study (2010) of the TAKS controlled for several demographic and intermediate variables and found that students who did well on the TAKS took AP classes, had a high grade point average, and ranked near the top of their class. The current research study only took into account the type of test that was taken and the relationship with college readiness, not the particular score on the test. The use of HSEE test scores might have impacted the results of the study. Baisey-Jackson’s research suggests that participating in AP courses is not enough to be successfully prepared for college; students also have to perform well in the courses.

In a similar study (Guerra, 2009), students who scored at the college-ready indicator on the TAKS also placed at the college-ready level on the college assessment test, ACCUPLACER. This study confirmed the positive relationship between the SBE and the likelihood of placement in college-level courses, thus supporting the finding of the current research study.

Likewise, Cimetta et al. (2010) concluded that performance on the AIMS was positively correlated to first-year grade point average and was as predictive as the ACT or SAT. However, when the high school grade point average was controlled for, there were
no other significant effects of AIMS. With respect to math, high scores on the AIMS were correlated with better performance in math courses during the first year of college (Cimetta, 2012). This study confirmed that the SBE was associated with college readiness as defined by grades in college math classes.

The MCAS, an SBE in Massachusetts, is considered to be rigorous (Hyslop, 2014). The majority of the students who placed at the advanced or proficient level on the HSEE enrolled in four-year institutions within the state after high school graduation. These results affirm the current study’s finding that SBEs are associated with college readiness.

College ready scores on the HSEE in Georgia, Florida, New York, and Oregon are used to place students in college-level courses in those states. According to Complete College America (2012), students who entered community colleges in Georgia and four-year colleges in Oregon and New York had low levels of placement in remedial courses. Both Georgia and Oregon administer SBEs while New York administers an EOC. The remediation rates suggest that the SBEs in the two states are rigorous enough to prepare students for college.

While previous state-level research studies show that some SBEs were associated with college readiness, the current study found that on a national level, SBEs were correlated with college readiness, thus adding to the body of literature about the impact of HSEE on college readiness.

The current research study was consistent with prior studies that have shown that EOCs are predictors of college readiness. Garland et al. (2011) examined the SOL in Virginia and found that the higher the math scores on the HSEE, the less likelihood that
students in the Class of 2008 enrolled in remedial math classes. This study also confirmed that in addition to the type of HSEE, the type of curriculum helps to prepare students for college. The HSEE in the study examines a class of students beyond the current research study that only looked at the Class of 2004. Thus, Garland’s study implies that later versions of EOCs are still predictive of college readiness.

All of the aforementioned studies, except one, referenced state-level research. Unlike those studies, the current research study examined a nationally representative sample of students from the graduating Class of 2004. The primary reason this study was undertaken was to investigate the impact of HSEEs on a national level. The premise of Astin’s I-E-O model is that while inputs are fixed variables, the environment can be changed to improve student outcomes. As such, based on the findings from this block, several recommendations to improve HSEE policies are presented later in this chapter. In addition, the results of this research study show that there was a weak relationship of HSEEs with college readiness as compared with other independent variables in the study. Therefore, further research is warranted in this area.

**Block six—Student involvement characteristics.** The fifth research question asked what influence, if any, do student involvement characteristics have on college readiness. This research question addresses the within-school environmental variables and tests Astin’s involvement theory. Twenty-two predictors emerged as significant in block six of the final model. Ever in Advanced Placement, participated in academic clubs, hours spent on homework outside of school, hours spent on reading outside of school, participated in basketball, participated in band/chorus, participated in football, participated in softball, participated in yearbook, how often discussed going to college
with parents, how often parents check homework, and ever in career academy were positive predictors of college readiness. Other attributes such as ever in ESL, participated in play/musical, participated in baseball, participated in solo sport, participated in student government, how often discussed ACT/SAT with parents, participated in soccer, participated in a program to prepare for college, participated in a college program for disadvantaged students, and participated in cheerleading were negative predictors of college readiness. The variables in this block accounted for .8% of the explained variance in the dependent variable.

Based on the review of the literature, some form of college experience in high school has been shown to increase college enrollment, college readiness, and college success among lower-achieving populations (AIR, 2013; U.S. DOE, 2011, p. 10). Students taking Advanced Placement courses are exposed to the college academic content. Thus, the finding that AP classes are a predictor of college readiness is consistent with prior research.

The studies in the review of the literature suggest that students who are involved in extra-curricular activities tend to do better in school (Fredericks & Eccles, 2006; Guest & Schneider, 2003; Lipscomb, 2007) and have higher college aspirations than students who are not involved. Thus, the findings that participation in a program to prepare for college and ever in a college program for disadvantaged students were negative predictors is a bit surprising. However, there is a plausible explanation as to why the latter is a negative predictor. Based on the current research study, the demographic variables of income and race were predictors of enrollment in remedial coursework. One would expect that students in a college program for the disadvantaged qualify based on
income, race, and parent’s level of education. This finding might be due to the interaction effect of those variables in the study. It is important to note that both variables had weak but positive relationships with college readiness. However, when they entered the regression model, their coefficients became negative, possibly suggesting suppressor effects. Though these two variables were negative predictors in the model, they had very weak relationships with the dependent variable in the regression model as compared with the other variables in the model.

Many programs that prepare students for college have a strong mentoring component and focus on college knowledge, college field trips, and financial aid advising (Conley, 2007; Contreras, 2011). These programs, though, might not have a strong academic focus that helps students to strengthen academic skills to prepare for college. The academic focus may explain why participation in a program to prepare for college was a negative predictor of college readiness in this current research study. This finding still warrants further research. A more detailed explanation of this finding is found later in this section.

Previous research studies show that participation in sports is positively correlated with increased academic achievement and college aspirations (Darling et al., 2005; Eitle & Eitle, 2002; Lipscomb, 2007; Marsh & Kleitman, 2002). Several of the findings in this study confirm these research studies. Students who participated in basketball, football, and softball were more likely to be enrolled in college-level courses at the first postsecondary institution. Another plausible explanation for these particular sports is that there is likely more emphasis placed on college scholarships for football and basketball than for baseball or soccer. Some sports teams might design study groups to ensure that
the teams are receiving the appropriate academic support to stay in compliance with school requirements.

Conversely, other research (Rees & Sabia, 2010) states that there is very little evidence to support that claim that participation in sports increases academic performance. Students participating in a solo sport or soccer might not have the same support of study groups. HSEEs are administered in the spring during the baseball season. The practice could take time away from preparation for the course and test material. The prior research confirms both findings that even though sports have been shown to increase academic achievement, there is also evidence suggesting the contrary. Further research might be warranted to explain why certain sports were associated with college readiness while other sports were associated with remediation in college.

Involvement in academic activities is more impactful than nonacademic activities (Astin, 1993; Wolf-Wendel et al., 2009). This statement might explain why participation in academic clubs, career academy, and yearbook were predictors of college readiness. It was surprising that participation in an academic honor society was not a predictor of college readiness. However, attention needs to be given to the fact that this variable changed direction in the regression model from entry to the last step. The change in direction indicates a possible interaction effect due to other variables in the model (e.g., grade point average) that might have suppressed the effect of this variable. Though the variable emerged as a negative predictor in the model, it had a weak relationship with the dependent variable as compared with the other independent variables. Nonetheless, further research on this variable is warranted. A more detailed explanation of this finding is found later in this chapter.
Previous research shows that doing homework, the amount of time spent on homework, and quality of the homework is positively correlated with academic achievement (Cooper et al., 2006). This study confirmed that the two homework variables, time spent on homework and time spent reading outside of school, were predictors of college readiness.

Participation in English as a Second Language was associated with remediation in college. Prior research shows that HSEEs have an adverse impact on ELLs due to the language barrier. As a result, ELLs had lower academic achievement scores on HSEEs than those who were not in ESL programs (CEP, 2012; Garcia, 2003; Kurlaender & Howell, 2012). This study confirmed the finding that being in ESL was a predictor of enrollment in remedial courses.

Time spent in extracurricular activities may detract from other activities and could have a negative impact on students’ grades (Broh, 2002; Brown & Evans, 2002). The use of time might explain why certain variables such as participated in play/musical, participated in student government, and participated in cheerleading were predictors of enrollment in remedial courses. Time spent in these activities might have impeded the students’ ability to improve their academic skills in reading, English, and math. Being involved in cheerleading would be time-consuming if cheerleaders perform and practice for more than one sport (e.g., basketball, football). It is important to note that participated in a play/musical and participated in cheerleading both had relatively weak relationships with the dependent variable as compared with the other independent variables. Further research is warranted to find out why these activities were predictors of enrollment in remedial courses.
Parental effort positively impacts student achievement (Houtenville & Conway, 2008). Parental involvement is particularly important for low-income students since research shows that this type of involvement affects both college enrollment and completion (Chrispeels & Rivero, 2001). This prior research supports the finding of the two predictor variables of college readiness that relate to parental involvement: how often discussed going to college with parents and how often parents check homework. However, the finding that discussed ACT/SAT with parents is a negative predictor suggests that discussing a college admissions test does not prepare a student successfully for college; it merely demonstrates that the student likely has plans to attend college.

The predictor variables in this block are of particular importance since they provide insight on how the environment or individual experiences of the students impact college readiness. According to Astin’s involvement theory, students who are more involved in school activities tend to do better academically than students who are not involved. Recommendations for students, parents, educators and administrators will be made later in this chapter based on the findings of the variables in this block. The recommendations can inform how stakeholders help to construct school environments that foster college readiness.

**Block seven—Intermediate characteristics.** The sixth research question asked what influence, if any, do intermediate characteristics have on college readiness. Seven predictors emerged as significant in block seven of the final model. Most recent SAT composite score, most recent ACT composite score, the number of months between high school graduation and college entry, math course-taking pipeline, and grade point average for ninth through 12th-grade were positive predictors of college readiness. Other
attributes such as units in math and total Carnegie units were negative predictors of college readiness. The variables in this block accounted for 2.1% of the explained variance in the dependent variable which is the largest variance of any block in the model.

Students who are best prepared from high school generally will perform well in college (ACT, 2005; Florida Department of Education, 2005; Martinez & Klopott, 2003). Students demonstrate their academic readiness by their grade point average and college admissions test scores (e.g., ACT, SAT). Previous research shows that grade point average in high school is the greatest predictor of success in college, particularly for students who maintain a grade point average of 3.0 and higher (ACT, 2013; Astin, 1993; Kuh et al., 2011; Jaffe, 2012; Pike & Saupe, 2002).

Similarly, high SAT and ACT scores indicate that students have met certain college readiness benchmarks. Students who met the ACT English and math college readiness benchmarks were less likely to take remedial courses (ACT, 2013). The findings of this study confirm that higher grade point averages, ACT and SAT scores are significant positive predictors of college readiness.

The number of months between high school graduation and postsecondary entry might seem to be a positive indicator of college readiness if the gap between high school and college is minimal. In this study, the researcher looked exclusively at students who entered college within two years. Results might be different if students entered college more than two years after high school graduation. Therefore, it is not surprising that students who attended college within two years of high school graduation were more likely to be enrolled in college-level courses.
Adelman (2006) noted that the greatest single predictor of how well students will do in college is whether students have taken a high-level math class in high school (algebra II, pre-calculus, trigonometry, and calculus). Similarly, Jaffee (2012) found that both grade point average and the highest math course taken were predictors of placement in college-level courses in his study of California HSEE and college placement scores. These studies confirm the findings in this research study of math course-taking pipeline (highest math class taken in high school) and grade point average being positively associated with college readiness.

The two negative predictors, units in math and total Carnegie units, seem surprising at first glance. A plausible explanation of the units in math finding is that the composition of higher level math classes impacts college readiness more than simply the number of units. Prior studies (Allensworth et al., 2009; Dougherty et al., 2006) demonstrated that a rigorous curriculum is more than a prescribed number of courses. Further, the majority of students who enroll in remedial math courses in college did not take Algebra II or beyond in high school (ACT, 2005; Adelman, 2006; Long et al., 2009). In order for students to be prepared for college, ACT (2005) recommends four years of English; four years of mathematics (algebra I, geometry, algebra II and one more upper level math course such as trigonometry); three years of natural sciences (biology, chemistry, physics); and three years of social studies (American history, world history, American government). Thus, a student might have earned the number of required credits to graduate from high school, but did not take the minimum core sequences that would be considered college-ready in math. Lastly, it is important to note that students
who do not score at a proficiency level on the HSEEs might enroll in .5 credits of math to prepare for the next administration of the test, thus increasing their units in math.

To improve the academic outcomes and address the criticisms cited in *A Nation at Risk*, states increased the number of credits students needed to graduate from 21.7 to 25.8 (NCES, 2007). This increase impacted math and science as well as other subjects such as history, arts, and foreign languages. The ACT’s recommendations for college readiness do not include coursework in the arts or foreign languages. By 2013, 19 states had graduation requirements that were considered “college and career ready” (Achieve, 2013). The Carnegie units ranged from a low of 18 to a high of 24. Even though Michigan requires 18 units, the lowest number of Carnegie units among the 19 states, it also requires four credits in English and Algebra II (Achieve, 2013). The core curriculum recommendations from ACT, increased credit hours, and college and career-ready graduation requirements are three illustrations as to why the number of Carnegie units is not an implication for college readiness. Additionally, students who do not score at the proficiency level on the HSEEs might need to enroll in remedial classes in English and math which could add additional Carnegie units.

It is important to note that units in math and total Carnegie units were highly correlated (.84), although the correlation was not at .90 or above. It is possible that the two variables contained similar information about the dependent variable. This similarity could have impacted the individual coefficients of the predictor variables. Both of the variables had weak, but positive relationships with the dependent variable. However, as the variables entered the regression model, their coefficients became negative. The change indicates a possible suppressor effect because these variables are interacting with
other independent variables in the model. Further research is warranted to examine the two variables and to determine which variables are contributing to the suppressor effect.

According to Astin and Antonio (2012), intermediate variables are variables that are unknown as the student entered the high school environment or had initial exposure to the environment. These variables, however, could have some effect on college readiness. Intermediate variables can be influenced by educators and administrators that are looking to construct environments that contribute positively to college readiness. Thus, several recommendations for policy and practice discussed later in the chapter will incorporate the findings from this block.

**Block eight—Institutional characteristics.** The seventh research question asked what influence, if any, do institutional characteristics have on college readiness. The institutional variables are included since institutional type can impact remedial course offerings. Ten predictors emerged as significant in block eight of the final model. The institution is private two-year, moderately selective, highly selective, and inclusive four-year institutions were positive predictors of college readiness. Other attributes such as institution has open admission policy, two-year public, four-year public, unclassified two-year institution, unclassified four-year institution, and private four-year were negative predictors of college readiness. The variables in this block accounted for 1.1% of the explained variance in the dependent variable.

Both two-year and four-year public universities had the highest rates of remedial enrollment, as compared to any other institutional type in 2007–2008 (NCES, 2013). Two-year institutions, due to the nature of their open access mission, offer more remedial courses than all other institutional types. Consequently, depending on the placement
procedures, it is likely that students enrolling in two-year or four-year public institutions have a greater likelihood of placing in a remedial course than students who enroll in private institutions. Thus, the two findings in this study that two- and four-year public institutions were associated with placement in remedial courses are confirmed by the review of the literature.

It is important to note that the variable four-year public institution had a positive relationship with the dependent variable. As it entered the regression model, though, its coefficient became negative. The change in direction might be attributed to the suppressor effect. This variable could be interacting with other independent variables in the model. Further research is warranted in this area.

Contrary to Schurdell’s study (2001), this study found that institutional type was a predictor for enrollment in remedial classes. Institutions with an open admissions policy had the highest rates of enrollments based on institutional selectivity (NCES, 2013). Open admission institutions accept all students. It is reasonable to assume that since these institutions are not selective, many students who do not meet the criteria to get into more selective institutions would apply to an institution with an open admissions policy. Therefore, it is no wonder why these students tend to be enrolled in remedial courses.

Though the selectivity codes in the NCES study (2013) did not directly match all of the selectivity codes in ELS: 2002, it is plausible to consider unclassified two- and four-year institutions as minimally selective. According to the 2005 Carnegie classifications, unclassified institutions are coded in this manner if the selectivity of the institution is unknown. In 2007–2008, minimally selective institutions had the second largest student enrollment in remedial courses among all selectivity types (NCES, 2013).
One would expect that students attending these institutions would be less prepared for college and may have enrolled because they did not meet the admissions criteria for more selective institutions. Thus, the finding that students who enrolled in unclassified two- and four-year institutions were more likely to be enrolled in remedial classes is not surprising.

Consistent with this study, highly selective and moderately selective institutions have the lowest student enrollments in remedial courses (NCES, 2013). Private institutions, in general, offer fewer remedial courses than public institutions. Two-year private institutions had lower remedial course enrollments than four-year private institutions (NCES, 2013). From 1999–2008, the remedial course-taking rates also decreased in private two-year institutions (NCES, 2013). Given that the population under study entered college in 2006, the finding that private two-year institutions were positively associated with college readiness is not surprising.

Another plausible explanation for the finding of private two-year institutions is that the variable had a negative correlation with the dependent variable. However, when the variable entered the regression model, its coefficient became positive. The change might indicate that the variable is interacting with other independent variables in the model causing a suppressor effect. Further research is warranted to examine which variables are suppressing the effect of private two-year institutions.

Highly selective, moderately selective, and inclusive institutions are categorized according to the 25th percentile ACT-equivalent scores of new students applying to the institution. Highly selective, moderately selective and inclusive ratings correspond to ACT score ranges of greater than 21, between 18 and 21, and less than 18 respectively.
It would appear that in this study, inclusive four-year institutions fall between minimally selective and moderately selective. An inclusive four-year institution was a positive predictor of college readiness.

The finding that an inclusive four-year institution was a positive predictor might warrant further research given that an ACT equivalent score of below 18 does not correspond to a college-ready indicator. However, since different institutions use different assessments to place students in remedial courses, this might explain the finding (Kurlaender & Howell, 2012). In particular institutions, remedial courses are strongly recommended, but not required and might be based on units earned in English or math from high school transcripts as opposed to ACT/SAT or placement test scores. Additionally, entering students could have received a higher ACT score in one of the subjects (e.g., English, reading, or math) placing them in one college-level course even though their composite ACT score was below 18.

It is important to point out that inclusive four-year institution had a negative correlation with college readiness. However, when the variable entered the regression model, its coefficient became negative. The change indicates that this variable might be interacting with other independent variables in the model causing a suppressor effect. Further research is warranted in this area.

At first glance, it seems surprising that students from private four-year institutions tended to be enrolled in remedial classes. One plausible explanation is that private institutions might attempt to increase their enrollments by diversifying their student body. This practice could result in accepting students who may not be academically ready to enroll in these institutions. As a result, the institutions might have more stringent policies
mandating enrollment in remedial courses. Another plausible explanation is that some four-year private institutions might try to build their sports programs by accepting athletes who are not “college ready” at the time they enroll at the postsecondary institution.

It is important to note that private four-year institutions had a positive correlation with college readiness. However, when the variable entered the regression model, its coefficient became negative. This change might indicate that the variable is interacting with other independent variables in the model causing a suppressor effect. Further research is warranted in this area.

Remedial course offerings vary by institutional type. Although this is a limitation mentioned earlier, the current study controlled for this variable. Many of the results for this research question were not surprising. However, there could have been an interaction effect with the number of selectivity variables, overall grade point average, and ACT/SAT scores whereby students with higher academic achievement might have enrolled in less competitive schools.

It is important to take into account another limitation of the study; the research did not examine whether students passed the HSEE. The study tracked students who were from states with an HSEE and entered college by 2006. While the assumption might be that the students in the sample passed the HSEE, the review of the literature suggests that several states offered alternative pathways for graduation for students who did not pass the test. Therefore, some students might have placed in remedial courses because they did not perform at a level proficient enough to pass the HSEE.
Lastly, another limitation of the study was that enrollment in remedial courses was through a self-reported survey. Though high school transcripts were verified for ELS: 2002, college transcripts were not available at the time the dataset was released. There could be an underrepresentation of students who reported enrollments in remedial courses given that students would be more likely to say that they were in college-level classes as opposed to remedial courses.

Taking the limitations of the study into consideration, the findings of the research question suggest effective pre-college counseling of guidance counselors at the high schools with students and parents to understand course placement in college. Institutional type is a fixed variable. However, as seen in this study, it has implications given the way in which college readiness is assessed.

**Implications for Practice and Policy**

This study was designed to examine if high school exit exams had any influence on college readiness while controlling for other input, environmental, intermediate variables, and institutional characteristics. With the need for students to enter college prepared, the outcome of college readiness is a critical dependent variable warranting further study. The findings of the study illustrate how the specific variables impact college readiness, thus providing a structure for increasing students’ ability to be more successful as they matriculate through high school.

There were at least two variables that were associated with enrollment in remedial courses that yielded surprising results: participation in the academic honor society, and ever in a program to prepare for college. The subsequent sections provide a more
detailed analysis of each variable. As stated earlier, further research is warranted for each of the variables.

The variable “participated in academic honor society” was a recoded variable that included students who took part in the academic honor society as well as students who held an officer position in the society. Nearly 26% of the students in the population under study participated in the academic honor society. However, almost 45% of the students had a grade point average of 3.0 or above in the ninth-grade. Students who participated in the academic honor society were less likely to be enrolled in college-level courses during their first year in postsecondary education. Students who had a grade point average of 3.0 or above in ninth-grade were more likely to be enrolled in college-level courses. A closer examination of the grade point average and other requirements for participation in the academic honor society might shed light on why this variable was not associated with college readiness.

The variable “ever in a program to prepare for college” was asked on the base year survey that was administered to students in the 10th-grade. Twenty-one percent of the students in the population under study responded “yes” to this question meaning that they had participated in a special program to help them either plan or prepare for college in either the ninth or 10th-grade. Unlike the survey question that asked if they had participated in a college program for disadvantaged students, this question did not provide any examples of what constituted a special program to help them either plan or prepare for college. So, students responded based on their own interpretation of the question. Students could have participated in a one-day program to one that was longer in duration, a workshop, or a variety of other programs that they viewed as helping them
to plan or prepare for college. The programs might not have been designed with an academic focus, thus helping them to increase college readiness skills. Additionally, if students participated in the programs in the ninth or 10th-grade but did not continue participation until they completed high school, they may not have gotten the full benefits of the program regarding academic preparation for college. According to the survey, the students responded that they participated in the program. However, information is not known from the current variable the length of time that students participated in the program.

A further analysis of the variable also showed that it had a high correlation with another variable “ever participated in Advanced Placement” though the correlation was not .90, which would be considered redundant. Therefore, these two variables could have contained similar information about the dependent variable. As a result, the coefficients of the two independent variables could have been impacted. Though these are plausible explanations for the finding, further research is warranted to determine why this variable was associated with enrollment in remedial courses.

Astin’s I-E-O model was used in this study to examine which predictor variables impact college readiness. This conceptual model, coupled with Astin’s student involvement theory, can provide useful information for educators to construct environments that are more conducive to fostering college readiness. The input or demographic variables in this study accounted for the second largest amount of total explained variance in the model at 2.0%. This finding is important to note because educators, policymakers, nor students can change these variables given that they are fixed. However, an understanding of the impact of individual variables (e.g., race,
gender, parental education, family composition) on college readiness might influence decisions to provide adequate support for student success.

The findings of this study provide useful information for educators and administrators to assist students in becoming ready for college. The information is also helpful for students who want to enroll in college-level courses during their first year of postsecondary education. Additionally, the information is useful for guiding policymakers in making decisions regarding HSEEs that have a greater likelihood of increasing college readiness. The subsequent sections address the implications of the study.

**Implications for high school students and parents.** This study has several implications for high school students and parents. The findings suggest that it would be beneficial for students to take the appropriate steps to ensure that they are prepared for college. Specifically, students can elect to take challenging math classes beyond Algebra II, engage in reading and homework outside of class given that these were positive predictors of college readiness. Students should also take advantage of any academic support services that will enable them to maintain at least a 3.0 grade point average and prepare and take the ACT/SAT. Students should become involved in extracurricular activities, but balance their time such that the activities do not interfere with studying outside of class. Additionally, students should enroll in college within two years of completing high school. Parents can assist by discussing academic goals and aspirations with their children. Lastly, since the HSEE policy, in general, did not increase college readiness, parents can play a vital role in advocating against HSEEs.
Implications for high school teachers, guidance counselors, and high school administrators. This study has several implications for high school teachers, guidance counselors, and high school administrators. The findings of this study suggest that high school teachers and administrators can advocate that their schools offer the highest level of math (beyond Algebra II) and encourage students to take these challenging courses. Administrators can advocate for courses such as Advanced Placement or any experiences that enable students to experience the college curriculum while in high school. Most importantly, high school teachers, guidance counselors, and administrators can advocate for a college and career ready curriculum as a high school requirement. High school administrators can bring more programs to their schools for low-income and first-generation students (e.g., TRIO Programs), but also ensure that these programs have a strong academic component to help their students gain the academic skills needed to be college ready. Additionally, ACT/SAT preparation programs can assist students in earning higher scores on the college admissions tests. Programs for English Language Learners should be offered to alleviate language barriers so students are more successful in school. Extensive pre-college counseling is needed to help explain college choices and college course placement to students and parents. High school administrators can offer professional development to improve the quality of pedagogy. Lastly, school administrators can advocate for more financial resources allocated to urban schools to improve the quality of education, particularly K–8 schools, so that students are better prepared once they enter high school.
Implications for Theory

This research study contributes to the body of knowledge on HSEEs and affirms prior research on specific environmental variables that influence college readiness. This research study also contributes to the body of knowledge on academic and nonacademic involvement factors that affect college readiness and supports prior research on the impact of various student involvement factors (Astin, 1993) on college readiness.

Astin’s I-E-O model is used as a conceptual model. This study affirmed prior studies of the impact of HSEEs on college readiness. Previous studies focused on state-level research on specific HSEEs: AIMS, MCAS, and TAKS. The current research study extends that knowledge by adding that on a national level, having an HSEE requirement was associated with remediation in college. However, when the type of HSEE was considered, SBEs and EOCs were correlated with college readiness while MCEs were correlated with remediation in college.

The study adds that particular institutional characteristics impact college readiness whereby Schurdell (2001) found that institutional type was not a significant predictor. Since no other national studies on HSEEs have controlled for type of institution, this study suggests that students who enroll in schools with extensive offerings of remedial classes are likely to place in remedial courses than institutions that offer fewer remedial offerings. At any rate, it would be helpful for students to become knowledgeable about remedial course offerings at their selected institutions before they enroll.

This research study supports previous research by Astin (1993) on the impact of student involvement on college readiness. Though the involvement theory was developed for college environments, its fundamental premise applies to other educational
settings, including high schools. This study also confirmed the notion that academic involvement is more influential than other types of involvement (Astin, 1993; Wolf-Wendel et al., 2009). There were more academic variables than nonacademic variables found in this research study that were positive predictors of college readiness.

This study adds to the body of knowledge of the various types of involvement that impact college readiness. Previous research on HSEEs and college readiness addressed the academic curriculum, showing that a rigorous curriculum influences students’ preparedness for college (ACT, 2005, 2013; Adelman, 2006; AIR, 2013; Long et al., 2009). This study provides new insights that college readiness is impacted by academic and nonacademic factors, parental involvement, the number of hours invested in homework, and participation in academic clubs and sports. Thus, providing such opportunities at the high school level could enhance students’ preparedness for college.

**Implications for HSEE Policy**

HSEEs were developed for two primary reasons. The first reason was to increase the academic achievement of students. The second reason was to signal to employers and colleges that students have earned skills to be successful in either direction they choose. If HSEEs impact college readiness, then they are meeting both of the original purposes. However, if HSEEs have not increased college readiness for all students, as this study has shown, then there is a need to discover other ways to help more students become college ready with or without HSEE policies. Based on the review of the literature on the history of HSEE testing and the study’s findings, several recommendations for policymakers include the following:
Monitor academic outcomes of HSEEs. Through the use of HSEE data, states can assess and evaluate how students are performing on the HSEEs. The data can be disaggregated by ethnicity, ELL, income, and gender to see if there are achievement gaps. By monitoring the outcomes, states will have evidence as to whether HSEEs are improving the academic achievement levels of all students. One of the major problems in the past has been that states either had no evaluation system or an inadequate evaluation system (CEP, 2002). By monitoring the data annually, states can implement a more sophisticated evaluation system.

Track student achievement into postsecondary education. The new common assessments, which several states will be using as HSEEs, purport to measure college and career readiness. States need to examine how many students place in remedial and college-level classes to determine whether students are better prepared for college. If students are not better prepared, then the policy on HSEEs need to be re-evaluated. In fact, policymakers should not implement an HSEE policy until there is a trend of data showing that academic outcomes are increasing, and more students are placing into college-level courses as a result of taking HSEEs.

Policymakers need to decide if the tests measure high school proficiency or college readiness. If the tests measure high school proficiency, then states should ensure that students are not withheld from graduating for not meeting college proficiency levels. Instead, students should be held to standards that demonstrate they have met the minimal academic achievement for high school proficiency. In this way, different scores on the tests would be used to assess high school proficiency and college readiness as claims have already been made (Ujifusa, 2012). While there should be assessments to determine
students’ academic level, these tests should not prevent students from graduating unless states are sure that the students have not met certain skills that will impede their success in college or beyond. However, if students are passing the tests without making academic gains, policymakers need to question the purpose of the time, resources, and money spent on the tests. Assessments can always be used to monitor student achievement; they do not have to be HSEEs.

**Adjust the school curriculum.** The high school curriculum needs to be adjusted to ensure that the Common Core State Standards are incorporated. While states agreed to use CCSS, only 19 states changed their curriculum to include the new content (Achieve, 2013). It is impossible for students to be college and career ready with mandated standards that are not covered in the curriculum. Students in states using the new assessments as HSEEs will be penalized for not demonstrating college and career readiness levels if these standards have not been adequately covered in the curriculum. The new assessments could result in more students not graduating from high school. Ultimately, this will mean that more students are not successfully prepared for college.

**Create a seamless assessment system.** If HSEEs indeed measure college readiness, then scores on the HSEEs should be used for college admissions and placement. As previously stated, only four states have used HSEE for these purposes in the past (CEP, 2011). Using HSEE scores for college admissions and placement decisions helps students, parents, and stakeholders to realize the value and impact of the tests. It also provides an incentive for students to perform well on the HSEEs.

**Lower cut off scores.** In many states, when an HSEE policy was implemented, research had not been done to measure academic gains over a period of time. States gave
themselves just enough time to select a company to construct the test and run a pilot test. However, there had not been any tracking of student scores into the next grade, or into postsecondary education. In several cases, when the HSEE policy had been implemented, policymakers lowered the cut-off scores to ensure that more students graduated, instead of getting rid of or revamping the HSEE policy (CEP, 2012, 2013). Lowering cut off scores sends the wrong message. Either the test does not measure what it purports to measure, or students have not learned what they should. Either way, college readiness has not been attained.

**A standard definition of college readiness is needed.** Since there are common standards to measure college and career readiness, there should be a common definition of college readiness. To date, only 33 states have a definition of college readiness (Hyslop, 2014). Students will not know if they are college ready if the concept has not been defined. Furthermore, states cannot measure college readiness if they have not defined it. Until all states have a uniform definition of college readiness, there will be ambiguity about the concept, and it will impact the newer assessments that are being used as HSEEs. In the absence of a standard working definition of college readiness, high schools and colleges will measure the concept differently.

**Reduce the number of assessments.** In a current study about assessments used by states to measure college and career readiness, 14 different test combinations were found (Hyslop, 2014). If 49 states adopted common core standards and common assessments have been developed to measure students’ attainment of the standards, 14 different combinations of assessments do not appear to be necessary.
The nation seemed to have moved in the right direction by utilizing Smarter Balanced and PARCC to construct the newer assessments. However, several other states are still using different test options. It has been difficult in the past to assess the impact of HSEEs because the tests vary from state to state. Reducing the number of assessments used as HSEEs can provide consistency as college readiness is defined.

**Change how remedial education is assessed.** There have been several changes in the way students are evaluated for remediation in college. Any college assessment needs to be aligned with the new common core standards, or there will not be a connection between the high school and college curriculum. Roughly two-thirds of the states did not have the same cut-off score on certain placement tests (e.g., ACT, SAT, COMPASS, Accuplacer, state-developed assessments) for college-level math and English courses at public two- and four-year colleges and universities by 2012 (Achieve, 2012). By having inconsistent policies and procedures at the postsecondary institutions, it is hard to compare the need for remedial courses accurately. More needs to be done for better alignment of high school and college policies on college readiness (CEP, 2004).

**Allow students time to master the new content.** The new common assessments are designed to measure the Common Core State Standards. The standards were adopted in 2010 and recently integrated into the curriculum. There needs to be a realistic timeframe in which students can learn the new standards. It could conceivably take a student from kindergarten through the ninth or 10th-grade to learn all of the new standards to be ready for the new assessments that are administered in the ninth or 10th-grade. States have already started implementing the new assessments as early as 2015, only a few years after the implementation of the new standards. This timeframe is a
disadvantage for students and another reason why sufficient time should be allowed for them to master the new academic material before implementing high stakes tests.

**EOCs and college readiness.** According to previous research and the finding of this study, EOCs have the greatest positive impact on college readiness as compared to SBEs and MCEs. Therefore, EOCs are likely to be more beneficial in increasing college readiness. This finding is important to note because PARCC offers EOCs and Smarter Balanced uses a comprehensive exam that can be converted into EOCs. Though this study also found that SBEs are associated with college readiness, it is plausible to suggest that with the new CCSS, a good balance of requirements might be needed. For instance SBEs that are aligned with the new college and career readiness standards might count as an HSEE and EOCs might be simply administered but not counted toward graduation requirements. Instead, scores on the EOCs, which are based on course content, might be used for placement into college courses.

**Find ways to motivate teachers and students.** The underlying assumption about HSEEs is that students, teachers, and administrators would work harder. However, studies show that HSEEs have not significantly increased student academic achievement. If scholarships are provided to students who score at the college-ready level on HSEEs, this might be an incentive to motivate students to perform. Additionally, if incentives are provided to high schools for student outcomes on the HSEEs, teachers and administrators might be more motivated to prepare students for college.

**Recommendations for Future Research**

The current study used blocked stepwise regression analysis because it is “the most versatile method for implementing the I-E-O model” (Astin & Sax, 1998, p. 252).
The conceptual framework allowed for the use of multiple variables that were known to impact college readiness. No other study, using statewide or national data on high school exit exams, used a conceptual or theoretical framework. This study used several demographic and involvement variables to get an in-depth view of the student experiences in high school. Additionally, it looked at institutional variables to control for different policies and offerings of remedial courses.

The researcher used 71 variables in the regression model and identified 64 variables that were significant predictors of college readiness. Though some of the findings raised questions, they provide information that is useful for stakeholders about how students can be better prepared for college. Additional areas that could be further studied to improve college readiness are reviewed in the subsequent sections.

**Additional data analysis.** The current study used stepwise multiple regression as the statistical test with course-taking patterns as the dependent variable. Future research can be conducted with a different dependent variable. For instance, to measure the impact of HSEEs, college math readiness might be used. In this way, the researcher can narrow down the specific variables that are predictors of college readiness in math. The same can be done to assess English/reading college readiness. The dependent variable can be changed to define college readiness as success (grade point average) in a college-level course (math or English). In this case, the study could examine the grades students earned in the college-level math or English course at the first postsecondary institution.

Lastly, additional statistical methods could be employed due to the numerous variables used. Hierarchical linear modeling might be used to help provide a better understanding of the interaction between student, school, and state-level variables on
college readiness. Also, an archival time series analysis might be used to investigate the impact of HSEEs over a period both before their implementation and after the implementation to track the long-term effects of the HSEE policy on college readiness. This type of analysis might indicate whether HSEEs or other state characteristics had an impact on college readiness.

**Future cohorts and other data sources.** This study used data from ELS: 2002, which represented the graduating class of 2004. Therefore, the results of the study are not generalizable to other cohorts of students. To confirm whether the same predictors of this study impact college readiness, the High School Longitudinal Study of 2009 (HSLS: 09) can be used since it is a more recent cohort consisting of ninth grade students in 2009. Research on future cohorts will also confirm whether the new common assessments that will be used as HSEEs yield different results since they are purported to be aligned to college and career readiness standards.

Further research can also be done on a nationally representative sample of students who scored at the college and career ready level on any of the new common assessments that will be used as HSEEs. The study can track the students through college entry to see if the students placed in college-level or remedial courses. The current research study did not examine scores on the HSEE, just the type of HSEE administered in the state.

Other data sources that can be used to investigate HSEEs include the National Educational Data Resource Center (NEDRC) for state-level data that mirrors school-level data, Census, and National Center of Education Statistics’ Common Core of Data.
Statewide data from higher education institutions can also be used for validating whether students placed and enrolled in remedial or college-level courses.

**Contributions to the Literature**

This research contributes to the literature in six ways. First, the current research study supports the limited prior research on HSEEs and college readiness. Although the impact of HSEEs is supported, this study builds upon the research by adding that SBEs and EOCs are also correlated with college readiness. Second, the study focuses on another measure of college readiness—student enrollment in remedial courses in college. Third, the study incorporates two theoretical models by Alexander Astin while focusing on variables that contribute to college readiness. The two theories used in tandem support the research of the importance of student involvement in high school and how it impacts college readiness. Fourth, the study provides recommendations for students, parents, high school administrators, educators, and policymakers based on the findings of the predictor variables. Fifth, the research study is a nationally representative study on HSEEs and college readiness and allows for a broader generalizability than prior state-level studies. Sixth, this study provides the research in support of alternative strategies to monitor student performance and ensure academic achievement beyond the use of HSEEs.

**Conclusions**

This study investigated the influence of high school exit exams on college readiness for a nationally representative cohort of high school students who enrolled in postsecondary education. Prior studies have focused on the impact of HSEEs on graduation and dropout rates, GED attainment, and college enrollment. This study is the
only one that used the most recent nationally representative cohort of students and 
examined whether they enrolled in remedial courses based on the type of HSEE. Further, 
this study incorporates both a conceptual and theoretical model using a multitude of 
predictor variables. As a result of the findings from this study, various recommendations 
are made to increase college readiness of students before they enter postsecondary 
education.

The results of this study contribute to the literature by identifying which HSEEs 
and other factors influence college readiness. The study suggests that testing alone does 
not lead to college readiness; schools must be improved by a rigorous curriculum that 
aligns with college and career readiness standards. This study identified ways that 
empower students to become college ready. Also, it provided recommendations for 
parents, educators, and administrators to construct environments that foster college 
readiness. Lastly, various recommendations were provided for policymakers to consider 
when deciding to implement an HSEE policy.

By 2020, it is estimated that all of the available jobs will require at least some 
type of college training (Hyslop, 2014). Also, there is a new trend of HSEEs that are 
purported to measure college and career readiness. As such, it is imperative that the 
nation learns how to best prepare students for college. However, there has to be a 
balance between holding high standards for students without compromising their access 
to postsecondary education. As long as the attention continues to be focused on 
increasing the number of Americans who enroll in college and earn degrees, college 
readiness will remain on the national agenda.
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Appendix A

The University of Toledo Institutional Review Board Approval

To:    David Meabon, Ph.D. and Felisa Eafford
       Department of Higher Education

From:  Walter Edinger, Ph.D., Chair
        Kamala London Newton, Ph.D., Vice Chair
        Mirella Purdee, Chair Designee
        Patricia Case, Ph.D., Chair Designee

Signed: [Signature]

Date: 11/25/14

Subject: IRB #200438
Title: The Impact of High School Exit Exams on College Readiness: A National Study

The University of Toledo
Department for Human Research Protections
Social, Behavioral & Educational Institutional Review Board
Office of Research, Rm. 2300, University Hall
2801 West Bancroft Street, Mail Stop 944
Toledo, Ohio 43606-3390
Phone: 419-530-2844  Fax: 419-530-2841
(FWA00010686)

On 11/24/14, the above research was reviewed and approved as Exempt (Category, 4) by the Chair and Chair Designee of the University of Toledo (UT) Social Behavioral & Educational Institutional Review Board (IRB). The requirement to obtain a signed consent form has been waived as this research is determined to be minimal risk and a signed consent document would be the only record linking the subject to the data. It was determined that this waiver for signed consent will not adversely affect the rights and welfare of the participants. This action will be reported to the committee at its next scheduled meeting.

Please Note: A consent form is not required for this study. However an information sheet regarding the study should be distributed to potential participants. This Information Sheet should include the name and telephone number of a contact person in case the subjects need additional information. It is also strongly encouraged that the study be explained verbally to potential subjects.

Items Reviewed: IRB Application Requesting Exempt Review

Designated as EXEMPT RESEARCH on: 11/24/14

Please read the following attachment detailing Principal Investigator responsibilities.
Appendix B

NCES Approval for Release of Findings to Non-licensed Individuals

From: IESDataSecurity [IESData.Security@ed.gov]
Sent: Friday, October 30, 2015 3:57 PM
To: Eafford, Felisa
Cc: 'Opp, Ron' [ron.opp@utoledo.edu]
Subject: RE: review of dissertation for ELS: Third Follow Up: license 13030012

Hello Dr. Opp,

You are cleared to disseminate the attached dissertation to non-licensed persons.

Thanks,

Jesse Rine
IES Data Security Office
U.S. Department of Education
1990 K Street, NW, Room 9060
Washington, DC 20006
(202) 502-7307

From: Eafford, Felisa [mailto:Felisa.Eafford@tri-c.edu]
Sent: Tuesday, October 27, 2015 7:41 PM
To: IESDataSecurity
Cc: Opp, Ron
Subject: RE: review of dissertation for ELS: Third Follow Up: license 13030012

Mr. Rine,

Please see revisions in the attached document. Thanks.

From: Opp, Ron [ron.opp@utoledo.edu]
Sent: Tuesday, October 27, 2015 5:03 PM
To: IESDataSecurity; Eafford, Felisa
Subject: Re: review of dissertation for ELS: Third Follow Up: license 13030012

Jesse,
I will work with Felisa to make these revisions immediately. Thanks for letting me know.

Best regards,

Ron
Appendix C

States By Type of High School Exit Exam in 2004

<table>
<thead>
<tr>
<th>HSEE States</th>
<th>Type of exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Alaska</td>
<td>Minimum Competency/MCE</td>
</tr>
<tr>
<td>Florida</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Georgia</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Indiana</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Louisiana</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>Comprehensive/ SBE and End-of-course</td>
</tr>
<tr>
<td>Minnesota</td>
<td>Minimum Competency/MCE</td>
</tr>
<tr>
<td>Mississippi</td>
<td>End-of-course/EOC</td>
</tr>
<tr>
<td>Nevada</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>New Jersey</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>New Mexico</td>
<td>Minimum Competency/MCE</td>
</tr>
<tr>
<td>New York</td>
<td>End-of-course/EOC</td>
</tr>
<tr>
<td>North Carolina</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Ohio</td>
<td>Minimum Competency/MCE</td>
</tr>
<tr>
<td>South Carolina</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Tennessee</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Texas</td>
<td>Comprehensive/ SBE</td>
</tr>
<tr>
<td>Virginia</td>
<td>End-of-course/EOC</td>
</tr>
</tbody>
</table>

Appendix D

Variables Used in Block Order

Block 1: Pretest

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Recoded Variable Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYS33E</td>
<td>Indicates whether student was ever in a remedial math class.</td>
<td></td>
</tr>
</tbody>
</table>

The pretest variable is from the Base Year Student Questionnaire
### Block 2: Demographic Variables

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Recoded Variable Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYINCOME</td>
<td>Indicates total family income from all sources.</td>
<td></td>
</tr>
<tr>
<td>F1RACE_1</td>
<td>Indicates whether student is White.</td>
<td></td>
</tr>
<tr>
<td>F1RACE_2</td>
<td>Indicates whether student is Black.</td>
<td></td>
</tr>
<tr>
<td>F1SEX</td>
<td>Respondent’s gender is male.</td>
<td>D_F1MALE</td>
</tr>
<tr>
<td>F1FATHED</td>
<td>Indicates highest level of education earned by father.</td>
<td></td>
</tr>
<tr>
<td>F1MOTHED</td>
<td>Indicates the highest level of education earned by mother.</td>
<td></td>
</tr>
<tr>
<td>F1COMP</td>
<td>Indicates that respondent lives with both parents.</td>
<td>D_TWOPARENTS</td>
</tr>
<tr>
<td>F1COMP</td>
<td>Indicates that respondent lives with both guardians.</td>
<td>D_GUARDIANS</td>
</tr>
<tr>
<td>F1COMP</td>
<td>Indicates that respondent lives with one parent.</td>
<td>D_ONEPARENT</td>
</tr>
<tr>
<td>F1COMP</td>
<td>Indicates that respondent lives with a parent and a guardian.</td>
<td>D_PGUARDIAN</td>
</tr>
<tr>
<td>F1STLANG</td>
<td>Indicates whether English is student’s native language.</td>
<td></td>
</tr>
</tbody>
</table>

The demographic variables are from the Base Year and First Follow-up Student Questionnaire.
### Block 3: Education Variables

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1RAGP9</td>
<td>Indicates respondent’s grade point average in 9th grade.</td>
</tr>
<tr>
<td>BYPARASP</td>
<td>Indicates how far in school parents wants child to go.</td>
</tr>
<tr>
<td>BYSTEXP</td>
<td>Indicates how far in school student wants to go.</td>
</tr>
</tbody>
</table>

The education variables are from the Base Year Student Questionnaire/Parent Questionnaire and High School Transcript.
### Block 4: School-Level Variables

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Recoded Variable Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYURBAN</td>
<td>Indicates whether respondent’s school is located in an urban area.</td>
<td>D_URBAN</td>
</tr>
<tr>
<td>BYURBAN</td>
<td>Indicates whether respondent’s school is located in a suburban area.</td>
<td>D_SUBURBAN</td>
</tr>
<tr>
<td>CP0FTE</td>
<td>Indicates the total number of full time teachers.</td>
<td></td>
</tr>
<tr>
<td>CP02STEN</td>
<td>Indicates the total school enrollment 2001/2002.</td>
<td></td>
</tr>
<tr>
<td>CP02FLUN</td>
<td>Indicates the percentage of students receiving free/reduced lunch in 2001/2002.</td>
<td></td>
</tr>
<tr>
<td>CP02MIN</td>
<td>Indicates the percentage of minority students in the school in 2001/2002.</td>
<td></td>
</tr>
<tr>
<td>F1A29R</td>
<td>Indicates the percentage of full-time teachers whose highest degree is Master’s.</td>
<td></td>
</tr>
<tr>
<td>BYREGION</td>
<td>Indicates whether school is located in the South.</td>
<td>D_SOUTH</td>
</tr>
<tr>
<td>BYREGION</td>
<td>Indicates whether school is located in the West.</td>
<td>D_WEST</td>
</tr>
<tr>
<td>BYREGION:</td>
<td>Indicates whether school is located in the Midwest.</td>
<td>D_MIDWEST</td>
</tr>
</tbody>
</table>

The school-level variables are all from Base Year and First Follow-up Administrator Questionnaire.
Block 5: HSEE or State-level Variables

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Recoded Variable Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1A14</td>
<td>Indicates whether the Class of 2004 must pass a test for high school diploma.</td>
<td></td>
</tr>
<tr>
<td>BYSTATE</td>
<td>Indicates whether state has a End-Of- Course Exam.</td>
<td>D_HSEEEEOC</td>
</tr>
<tr>
<td>BYSTATE</td>
<td>Indicates whether state has a Minimum Competency Exam.</td>
<td>D_HSEEMCE</td>
</tr>
<tr>
<td>BYSTATE</td>
<td>Indicates whether state has a Standards Based Exam.</td>
<td>D_HSEESBE</td>
</tr>
</tbody>
</table>

The BYSTATE variable was used to recode by the type of HSEE administered in each state. The HSEE or state-level variable is from the Base Year Administrator Questionnaire.
### Block 6: Involvement Variables

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Recoded Variable Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYS33A</td>
<td>Indicates whether respondent was ever in Advanced Placement Program.</td>
<td></td>
</tr>
<tr>
<td>BYS33G</td>
<td>Indicates whether respondent was ever in English as a Second Language Program.</td>
<td></td>
</tr>
<tr>
<td>BYS33K</td>
<td>Indicates whether respondent was ever in a career academy.</td>
<td></td>
</tr>
<tr>
<td>BYS33L</td>
<td>Indicates whether respondent was ever in a program to help prepare for college.</td>
<td></td>
</tr>
<tr>
<td>BYS34B</td>
<td>Indicates the hours/week spent on homework out of school.</td>
<td></td>
</tr>
<tr>
<td>BYS35B</td>
<td>Indicates the hours/week spent on math homework out of school.</td>
<td></td>
</tr>
<tr>
<td>BYS43</td>
<td>Indicates the hours/week spent on reading homework out of school.</td>
<td></td>
</tr>
<tr>
<td>BYS85A</td>
<td>Indicates how often parents check homework.</td>
<td></td>
</tr>
<tr>
<td>F1S64G</td>
<td>Indicates how often parents discussed preparation for the ACT/SAT.</td>
<td></td>
</tr>
<tr>
<td>F1S64H</td>
<td>Indicates how often parents discussed going to college.</td>
<td></td>
</tr>
<tr>
<td>BYSOLOSP</td>
<td>Indicates whether student participated in a solo sport.</td>
<td>R_BYSOLOSP</td>
</tr>
<tr>
<td>BYBSKTBBL</td>
<td>Indicates whether student participated in basketball.</td>
<td>R_BYBSKTBBL</td>
</tr>
<tr>
<td>BYBASEBL</td>
<td>Indicates whether student participated in baseball.</td>
<td>R_BYBASEBL</td>
</tr>
<tr>
<td>BYSOCCER</td>
<td>Indicates whether student participated in soccer.</td>
<td>R_BYSOCCER</td>
</tr>
<tr>
<td>BYSOFTBL</td>
<td>Indicates whether student participated in softball.</td>
<td>R_BYSOFTBL</td>
</tr>
</tbody>
</table>

*(Block 6 continues)*
Block 6: Involvement Variables

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Recoded Variable Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYFOOTBL</td>
<td>Indicates whether student participated in football.</td>
<td>R_BYFOOTBL</td>
</tr>
<tr>
<td>F1S26I</td>
<td>Indicates whether student participated in academic club.</td>
<td></td>
</tr>
<tr>
<td>F1S26F</td>
<td>Indicates whether student participated in academic honor society.</td>
<td></td>
</tr>
<tr>
<td>BYCHRDL</td>
<td>Indicates whether student participated in Cheerleading.</td>
<td>R_BYCHRDL</td>
</tr>
<tr>
<td>F1S26C</td>
<td>Indicates whether student participated in band/chorus.</td>
<td></td>
</tr>
<tr>
<td>F1S26E</td>
<td>Indicates whether student participated in student government.</td>
<td></td>
</tr>
<tr>
<td>F1S26D</td>
<td>Indicates whether student participated in a play/musical.</td>
<td></td>
</tr>
<tr>
<td>F1S26D</td>
<td>Indicates whether student participated in newspaper/yearbook.</td>
<td></td>
</tr>
<tr>
<td>F1S23</td>
<td>Indicates whether student participated in program to prepare disadvantaged for college.</td>
<td></td>
</tr>
</tbody>
</table>

The involvement variables are from the Base Year and First Follow-up Student Questionnaire.
### Block 7: Intermediate Variables

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Recoded Variable Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1RAGPP</td>
<td>Indicates grade point average for grades 9-12.</td>
<td></td>
</tr>
<tr>
<td>FIRMAPIP</td>
<td>Indicates highest math course taken in high school.</td>
<td></td>
</tr>
<tr>
<td>FIRMAT_P</td>
<td>Indicates total units in math taken.</td>
<td></td>
</tr>
<tr>
<td>FIRHTUNP</td>
<td>Indicates total Carnegie graduation units in high school.</td>
<td></td>
</tr>
<tr>
<td>TXACTC</td>
<td>Indicates most recent composite ACT score.</td>
<td></td>
</tr>
<tr>
<td>TXSATC</td>
<td>Indicates most recent composite SAT score.</td>
<td></td>
</tr>
<tr>
<td>F2HS2PS1</td>
<td>Indicates number of months between high school and postsecondary entry.</td>
<td></td>
</tr>
</tbody>
</table>

TXACT and TXSAT (ACT and SAT scores) are from linkages from ELS: 2002 to external sources: College Board and ACT and the other intermediate variables are from the High School Transcript.
## Block 8: Institutional Variables

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Recoded Variable Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2PS1SLC</td>
<td>Indicates whether institution is unclassified two-year.</td>
<td>D_F2SELCUNC2YR</td>
</tr>
<tr>
<td>F2PS1SLC</td>
<td>Indicates whether institution is unclassified four-year.</td>
<td>D_F2SELCUNC4</td>
</tr>
<tr>
<td>F2PS1SLC</td>
<td>Indicates whether institution is moderately selective four-year.</td>
<td>D_F2SELCMOD4YR</td>
</tr>
<tr>
<td>F2PS1SLC</td>
<td>Indicates whether institution is inclusive four-year.</td>
<td>D_F2SELCINC4YR</td>
</tr>
<tr>
<td>F2PS1SLC</td>
<td>Indicates whether institution is a highly selective four-year institution.</td>
<td>D_F2SELCHI4YR</td>
</tr>
<tr>
<td>F21OPNAP</td>
<td>Indicates whether the institution has an open admissions policy.</td>
<td></td>
</tr>
<tr>
<td>F2PS1SEC</td>
<td>Indicates whether institution is two-year public.</td>
<td>D_PS1SEC2PUBLIC</td>
</tr>
<tr>
<td>F2PS1SEC</td>
<td>Indicates whether institution is private two or more years.</td>
<td>D_PS1SEC2PRIV</td>
</tr>
<tr>
<td>F2PS1SEC</td>
<td>Indicates whether institution is four-year public.</td>
<td>D_PS1SEC4PUBLIC</td>
</tr>
<tr>
<td>F2PS1SEC</td>
<td>Indicates whether institution is private four or more years.</td>
<td>D_PS1SEC4PRIV</td>
</tr>
<tr>
<td>F2PS1OUT</td>
<td>Indicates whether institution is in or out of state.</td>
<td></td>
</tr>
</tbody>
</table>

The Institutional variables are all from F2 (Second Follow-up) Student Questionnaire with matched data from Integrated Postsecondary Education Data System (IPEDS)