2022

Predicting Physical Therapist Assistant Program Completion by Prior College Enrollment Status

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This is to certify that the doctoral dissertation by

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Abstract

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MA, Spring Arbor University, 2010

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Dissertation Submitted in Partial Fulfillment

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Abstract

A growing number of university graduates delay workforce entry to reverse transfer to a community college for additional training. This trend is common in 2-year physical therapist assistant (PTA) programs where over 34% of all PTA students have a prior earned bachelor's degree. The problem addressed in this study is that little research is available to determine how PTA students' prior college enrollment status predicts PTA program completion. The purpose of this quantitative, causal-comparative study was to determine if students' prior college enrollment status predicts PTA program completion, while controlling for ethnicity. Astin's input-environment-outcome college effect model was the framework for comparing three different student inputs related to the students' prior college enrollment status of: (a) first-time college; (b) some college no degree; and (c) postbaccalaureate reverse transfer, to the outcome of PTA program completion. A convenience sample of deidentified student level data (N = 548) from three PTA programs in a Midwestern state was used for binary logistic regression to analyze if a predictive relationship exists between prior college enrollment status and PTA program completion. The status of first-time college and postbaccalaureate reverse transfer were predictive (p <.05) of program completion and postbaccalaureate students completed at the highest rate. White students completed at a higher rate than minority students. Further research is needed to gain insight to the input factors that impact program completion. Positive social change may result by supporting better informed leaders in PTA education to aid in designing support services to PTA students to increase program completion and ensure the workforce supply of PTAs.

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Acknowledgments

I am grateful to my husband who never doubted that I could finish my doctorate, and I am blessed to be surrounded by such supportive and loving children, family and friends who cheered me on when the finish line seemed so far off. To my parents whom I surprised with my doctoral degree on the day of commencement, you have inspired me to be the best version of myself. Surprise!

My deepest gratitude to Dr. Joanna Karet for her tireless guidance that helped to shape my study and to Dr. Cathryn Walker for her encouragement and feedback. I am appreciative of the many staff, faculty, leaders, and fellow students at Walden who shared parts of this journey with me.

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Chapter 1: Introduction to the Study

Introduction

In the United States, postsecondary education serves an important role in the preparation of a skilled workforce. From 2019 to 2020, over 16 million students enrolled in degree-granting postsecondary institutions; 66% of those students enrolled in 4-year institutions and the remaining 34% of degree-seeking students were enrolled in 2-year community colleges (Irwin et al., 2021). Many of the students that enrolled in a community college earned credits or degrees to transfer toward a bachelor's degree at a 4-year institution. However, an increasing number of students have moved in the opposite direction by transferring from a 4-year institution to a 2-year institution (Friedel & Friesleben, 2017; Haas & Hadjar, 2020; Townsend, 2001). The phenomenon of students moving from a 4-year to a 2-year degree program is occurring more frequently amongst students who either graduate from or drop out of a baccalaureate program to enroll in a community college to pursue a health career (Shapiro et al., 2019a) and a disproportionate number of minority students reverse transfer to a community college without completing a 4-year degree (Haas & Hadjar, 2020).

One of the associate degree health careers that former baccalaureate students pursue is physical therapist assistant (PTA). In the United States, the annual enrollment in PTA programs is over 12,000 students and nearly one-third of these students have earned a bachelor's degree prior to enrolling in a PTA program (Commission for the Accreditation of Physical Therapy Education [CAPTE], 2021a). Since the completion rates in PTA programs show a downward trend (CAPTE, 2020a), the completion rates of

students who transferred from a baccalaureate program must be studied to determine if these students persist to degree completion in a PTA program after completing college credits or a degree from a 4-year institution. Additionally, there are completion gaps in PTA education amongst some ethnicities, with the highest proportion of noncompleters being African American students (CAPTE, 2020a). Through this study, I gathered information for PTA program directors regarding the likelihood of PTA program completion for students who have earned credits or a degree from a 4-year institution prior to enrolling in a PTA program, while controlling for ethnicity.

In Chapter 1 I provide an overview of the study. The overview includes the background, problem statement, purpose, research question, hypotheses, nature of the study with methodology, theoretical framework, definitions, limitations and delimitations, assumptions, and significance for social change.

Background

Traditionally, community colleges in U.S. higher education have been the entry point for students who aspire to complete college credits or an associate degree to transfer to a 4-year institution. More recently, some students have followed a different pattern of enrolling in community colleges after already earning credits or a degree at a 4-year institution, a phenomenon termed *reverse transfer* (Friedel & Friesleben, 2017; Townsend, 2001). Reverse transfer refers to students who enroll in college in a pattern opposite of the traditional community college-to-university trajectory (Townsend & Dever, 1999). A reverse transfer student may shift directly from the university to the community college, or they may take a stop out or a temporary leave of college before

enrolling in a 2-year program. Students who have stopped out of college prior to completing a bachelor's degree are termed *some college no degree,* and the number of students who returned to college increased to 36 million by 2019, up from 29 million in 2014; the majority of these returning students enrolled in a community college (Shapiro et al., 2019a). Students who completed a bachelor's degree prior to enrolling in an associate degree program, termed *postbaccalaureate reverse transfer students* comprised 8% of community college students in 2015 (Radwin et al., 2018). Due to the growing numbers of reverse transfer students in community colleges, leaders in higher education have recently taken a closer look at the impact this trend has on degree completion.

College leaders are seeking to understand whether the inverse trajectory of reverse transfers contributes to the declining completion trends at both 2-year and 4-year institutions, or if students who reverse transferred from a university to a community college remained enrolled and completed an associate degree (Haas & Hadjar, 2020). In 2015, postbaccalaureate reverse transfer students comprised 8% of degree-seeking community college students, but the proportion of associate degree completers with a prior bachelor's degree was only 3.5%, which may indicate low completion rates of these students (Radwin et al., 2018). Researchers have suggested that the seemingly low completion rates of postbaccalaureate reverse transfer students may be explained by the completion challenges they faced which are linked to the external pressures of work, family, and debt loads (Mukherjee et al., 2017). Students with some college no degree who enrolled in community colleges to achieve degree completion and enter a desired career field had a completion rate of 25% in associate degree programs in 2018 (Causey

et al., 2020a) which was lower than the 28.8% completion rate for first-time community college students in 2018 (Juszkiewicz, 2020).

The completion barriers for reverse transfer students are particularly relevant in PTA education. Although the overall proportion of reverse transfer students who shift from a 4-year institution to a 2-year institution has declined slightly (Causey et al., 2020a), the number of reverse transfer students enrolling in 2-year PTA programs has steadily increased, particularly among students who have already earned a bachelor's degree (CAPTE, 2020a). In 2014, postbaccalaureate reverse transfer students comprised 30.4% of PTA program enrollment; the percentage had climbed to 34.7% in 2019 (CAPTE, 2020a). The proportion of enrollment by postbaccalaureate reverse transfer students in PTA programs is three to four times higher than the proportion of enrollment in other 2-year programs (Friedel & Friesleben, 2017; Radwin et al., 2018). Despite CAPTE's tracking of the enrollment trends of postbaccalaureate reverse transfer students in PTA programs, the completion rates of these students have not been documented. Data regarding first-time college students and reverse transfer students with no prior degree are not disaggregated in compulsory PTA program reporting to CAPTE. However, PTA program directors report student ethnicity to CAPTE for both enrollment and completion data, and aggregate completion rates for each ethnicity are included on the annual CAPTE aggregate data report (CAPTE, 2020a).

By conducting this study, I addressed the gap in knowledge regarding the ability to predict PTA program completion by the prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, while

controlling for ethnicity. Results of the study are necessary for establishing empirical evidence from which to assess admissions and enrollment policies in PTA programs and will contribute to positive social change with the information needed to provide supportive services to students to improve program completion rates.

Problem Statement

The problem that I addressed in this study was that little research is available to determine how PTA students' prior college enrollment status predicts PTA program completion. Although postbaccalaureate reverse transfer students have demonstrated prior academic success in a 4-year program, the outcomes of these students who enroll in a PTA program are not well understood (Friedel & Friesleben, 2017). From 2014 to 2019, the number of postbaccalaureate reverse transfer students enrolling in PTA programs increased, but national PTA program completion rates decreased. In 2014 the mean national completion rate was 85.7% and in 2019 the rate declined to 83.4% (CAPTE, 2020a).

In 2019, the CAPTE formula for calculating completion rates changed to exclude nonacademic withdrawals from the PTA program, so the actual completion rates of all enrolled students may be lower than the reported figures (CAPTE, 2020a). For example, the completion rate of a cohort of 20 students with three academic failures and two nonacademic voluntary withdrawals was calculated as 83% (15 of 18 completed) rather than 75% (15 of 20 completed) since the two nonacademic voluntary withdrawals are dropped from the calculation denominator. It is probable that postbaccalaureate reverse transfer students are among those students who are academically successful but who

voluntarily withdraw from the PTA program prior to completion for other reasons such as work, family, and financial burdens (Mukherjee et al., 2017). The current method of calculating PTA program completion rates may result in uncounted noncompleters and incomplete data of the nationally reported outcomes of PTA programs.

Some PTA program directors must address deficits in student retention with individual institutional program completion rates as low as 25% from 2014 to 2019 (CAPTE, 2020a), far below the required CAPTE accreditation standard rate of 60% (CAPTE, 2020b). Since researchers have identified that reverse transfer students had lower completion rates than first-time students in community colleges (Causey et al., 2020a; Huie et al., 2021) and little is known about how the increasing enrollment of reverse transfer students in PTA programs has impacted PTA program completion rates, more research was needed to determine what impact a student's prior college enrollment status had on PTA program completion. PTA program directors must also address completion gaps amongst students of various ethnicities (CAPTE, 2020a), but insufficient PTA education research data are available to guide their efforts. PTA program directors need more information about the probability of PTA program completion for three groups of students: (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer, while also considering the influence of student ethnicity.

Purpose of the Study

The purpose of this causal comparative study was to determine if students' prior college enrollment status predicts PTA program completion, while controlling for ethnicity. This study is unique because PTA students have rarely been studied at a student

level to determine if a relationship exists between PTA students' prior college enrollment status and PTA program completion (APTA, 2019; Jensen et al., 2016). The population for this study was a convenience sample of students who were enrolled between 2014 to 2019 in three target PTA programs in a Midwestern state. The sample included all enrolled PTA students from each institution for the 6-year target dates. The average PTA program class size was 23 enrollments per year, and one institution had two campuses of PTA programs, for a total sample population of 548 students.

Research Questions and Hypotheses

I used the following research question to guide this study:

Research Question (RQ): To what extent is there a predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and PTA program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state?

Null Hypothesis (H_0): There is no predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state.

Alternative Hypothesis (H_1): There is a statistically significant predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate

reverse transfer, and program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state.

Theoretical Framework

The theoretical framework for the study was Astin's (1991) input-environment-outcome (I-E-O) college effect model. Astin developed the model for its utilitarian value in guiding the complex assessment and evaluation processes that occur in higher education which are aimed at analyzing the effectiveness of policies and practices to achieve desired educational outcomes. Astin's model is used as a lens from which to view outcomes assessment in higher education through an examination of the student input (I), the environment (E), and the student outcomes (O). Such assessments and evaluations occur in multiple areas including (a) the assessment of students for admission to the institution, (b) the assessment of student learning between points in time, (c) the assessment of faculty performance and effectiveness, and (d) the assessment of the institution's overall student success outcomes such as graduation rates, credentialing, and job placement.

The I-E-O model is well-suited for a framework in which to quantify the outcome measures of an educational program in the context of independent and dependent variables. The input (I) represents the independent variables of student aptitudes, knowledge, and pretest performance prior to enrollment in a program or a class. The environment (E) represents the independent variable related to institutional or program characteristics, enrollment experiences, and educational interventions. The outcome (O) serves as the dependent variable being studied, which is the primary focus of the

assessment process (Terenzini, 1989). The I-E-O model is used as a guide by administrators in the practice of assessment via a more comprehensive approach than the historical practices which involved the evaluation of either the input or the environment on the measured outcome variable but failed to account for the interplay of all three variables.

PTA program directors continuously measure student outcomes, such as program completion rates, to analyze PTA program effectiveness. The characteristics of the PTA program such as the curriculum model, faculty profiles, and length of clinical education experiences are measures of the environment (Gresham et al., 2015). In the I-E-O model, Astin (1991) identified the interplay of variables which affect outcomes that extend beyond the program characteristics such as the student's aptitudes and experiences before enrolling in a PTA program. These pre-enrollment experiences comprise variations in the input (Easley, 2016). Conducting this study involved a comparison of three different student inputs, related to the students' prior college enrollment status of: (a) first-time college; (b) some college no degree; and (c) postbaccalaureate reverse transfer, to the outcome of PTA program completion. The input of student ethnicity was included as a covariate. I will provide a more detailed summary of the prior research of known input and environment factors in Chapter 2.

Nature of the Study

I conducted this study using a quantitative methodology and a causal-comparative design to address the problem and research question. A quantitative methodology was necessary in this study because I analyzed empirical data for relationships between

independent and dependent variables. An empirical epistemology and positivist ontology rooted in Comte's (1856) framework of positivity in the study of natural phenomena gives the context for interpreting observations of relationships in terms of empirical data.

A causal-comparative design is useful to determine the relationships between the independent and dependent variables by comparing two or more groups of individuals. In this study, the independent variable was the prior college enrollment status of PTA students, and the dependent variable was the PTA program completion status. I used a binary logistics regression analysis to analyze the independent variable, prior college enrollment status, of: (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer, for any relationships to the dichotomous dependent variable, PTA program completion status.

I used a convenience sample of PTA students from three target institutions in a Midwestern state to answer the research question, to what extent is there a predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and PTA program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state. The PTA program completion rates of this Midwestern state are consistent with, although slightly below, the national PTA program completion rates (CAPTE, 2020a). Voluntary participation was confirmed by program directors and institutional leaders to provide deidentified student-level data. The total sample size was 548 students for the 6-year target dates with an average class size of 23 students per enrollment cohort.

Definitions

Commission for the Accreditation of Physical Therapy Education is the sole accrediting body for specialized programs of doctoral physical therapist programs and associate degree physical therapist assistant programs (CAPTE, 2020b).

Completion Rate is the percentage of students who graduated from the PTA program within 150% of enrollment length, so for a 2-year program it is 3 years. (CAPTE, 2021b).

First-time college student is defined in the Ohio Department of Higher Education Data and Reports as a first-time, degree-seeking undergraduate student who is enrolled in 12 or more hours in the fall term (Huie et al., 2021).

Postbaccalaureate reverse transfer students are students who have a prior earned bachelor's degree then enroll in a sub-baccalaureate program (Townsend, 1999).

Some college no degree refers to students who have earned some college credits, but no degree prior to stopping out. The National Student Clearinghouse defines a *stop-out* as more than 123 days between the end-date of an enrollment record and the begin-date of the next enrollment record (Shapiro et al., 2019a). For this study there was no differentiation between the reverse transfer students who directly enrolled in a PTA program from a university without stopping out versus a student who had stopped out prior to enrolling in a PTA program. All students with prior earned credits, but no degree, will be designated as some college no degree. Students who had an associate degree were included in this group since CAPTE only reports bachelor's degrees or beyond for student inputs (CAPTE, 2020a)

Assumptions

I made several assumptions for this study. First, I assumed that PTA program directors who participated in the study and provided deidentified student level data were using customary naming conventions and definitions of student outcomes, as defined in this chapter, for students' prior college status of: (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer. I also assumed that program directors held accurate records of PTA student enrollment, ethnicity, retention, and completion status according to the required reporting of CAPTE's Annual Accreditation Reports (AAR). Lastly, I assumed that the PTA program aggregate data provided by CAPTE was an accurate reflection of enrollment and completion rates for both national and statewide outcomes, as reported to them by individual PTA programs in the AAR.

Scope and Delimitations

This study was delimited in scope to three PTA programs in a Midwestern state for a convenience sample that was accessible if a partner site would require on-site assistance during data collection. I used binary logistic regression analysis to answer the research question using the deidentified student level data of prior college enrollment status, ethnicity, and PTA program completion status.

The timeframe of 2014 to 2019 was a brief, 6-year snapshot of trends in PTA program completion that most PTA program directors would have archived data available. Because trends can change over time, I could only represent the trends during this specific 6-year period and may have limited generalizability to future PTA program completion trends.

Limitations

A limitation for this study was that the data from this study reflected data from only three target institutions in one Midwestern state with less ethnic diversity than the population of all U.S. PTA students. The sample size represented less than 1% of the U.S. population of PTA students between 2014 and 2019. Additionally, students with some college no degree were grouped together regardless of the number of prior earned credits and no information was collected regarding the amount of time reverse transfer students stopped out of college before enrolling in a PTA program. Students do not consistently self-report all prior college credits when enrolling in a PTA program, so not analyzing the PTA program completion status based on a quantitative variable for prior college credits reduced the likelihood of inaccurate data related to the number of prior credits.

Significance

This study is important because it informs PTA program directors on the relationship between PTA students' prior college enrollment status, ethnicity, and PTA program completion and extends limited research by Easley (2016) and Kabiri et al. (2017) on other known pre-admission student inputs which predict PTA program completion such as prerequisite GPA and pre-admission reading level. Potential contributions of the results of this study include the advancement of admissions and student support services policies to aid in PTA student program completion. Positive social change is achieved with better informed stakeholders addressing students' needs in three ways: (a) understanding the enrollment results of first-time college, some college no degree, and postbaccalaureate reverse transfer students in PTA programs to assist college

administrators in providing supportive services aimed at improving PTA program completion; (b) reviewing admissions policies to promote the selection of students who are most likely to achieve PTA program completion; and (c) prioritization of recruitment strategies to draw students to PTA programs at the most expedient point in the college enrollment trajectory while increasing minority enrollment. (Freismuth, 2017; Love, 2019).

Summary

In this chapter I introduced the problem of community college completion rates for students who have already earned credits or degrees at 4-year institutions. Since most PTA students have attended some college and one in three has earned a bachelor's degree before enrolling in a 2-year PTA program, more information was needed about any relationships that this prior college enrollment status had on PTA program completion. I discussed Astin's (1991) I-E-O model as the theoretical framework that I used for the study because the independent variable, prior college enrollment status, was an input factor and the dependent variable, PTA program completion, was the measured outcome. The second input variable, ethnicity, served as a covariate. I also provided the research question, nature of the study, assumptions, and limitations and discussed positive social change implications for stakeholders in PTA education.

In Chapter 2 I describe the literature search strategy and comprehensive literature review of prior research on community college completion, reverse transfer trajectories of students, and PTA education. I also give an extended explanation of the theoretical foundation for the study.

Chapter 2: Literature Review

Introduction

The problem that I addressed in this study was that little research is available to determine how physical therapist assistant (PTA) students' prior college enrollment status predicts PTA program completion. The purpose of this causal comparative study was to determine if students' prior college enrollment status predicts PTA program completion, while controlling for ethnicity. Students who transfer from a 4-year institution to a 2-year institution are termed reverse transfer students, and there is evidence that reverse transfer students have lower degree completion rates at 2-year institutions than first-time college students, despite prior academic success. (Causey et al. 2020a; Huie et al., 2021; Mukherjee et al., 2017). Downward trends in PTA program enrollment and completion prompt an investigation of the input factors which can predict completion outcomes.

In Chapter 2, I include the literature search strategy and an extended explanation of the theoretical foundation for the study. I also provide an exhaustive review of the current literature related to key variables.

Literature Search Strategy

I searched Thoreau at Walden University Library databases and Google Scholar for education specific peer reviewed studies related to *college completion, community college, physical therapist assistant, reverse transfer, postbaccalaureate reverse transfer, retention, attrition, trajectory, first-time college, ethnicity,* and *student debt burdens*. Published studies on the phenomenon of postbaccalaureate reverse transfer students emerged in the 1990s. I searched Proquest Dissertations for *physical therapist assistant,*

postbaccalaureate reverse transfer, and *community college completion.* Citations from previous studies and dissertations were useful for identifying the relevance of Astin's I-E-O theoretical framework for assessment in higher education and for framing studies that examine the effect of pre-enrollment inputs on student outcomes such as degree completion. Research studies specific to PTA education were searched in the *Journal of Physical Therapy Education.* I found *v*ery few articles that focused on PTA education rather than physical therapist (PT) education. In total, five peer-reviewed articles have been published in the last decade that provide information on either input or environment factors related to PTA program outcomes, primarily PTA program completion and licensure examination success. One study was published in the *Journal of Allied Health* in which the authors examined PTA program pre-admission testing and the relationship on post-graduation PTA licensure exam results. The most current PTA education research was published in the *Journal of Allied Health Sciences and Practice* and involved a survey of clinicians' perceptions about the roles and educational needs of PTAs (Jewell et al., 2022).

Theoretical Foundation

The theoretical framework for the study was Astin's (1991) input-environment-outcome (I-E-O) college effect model. Astin's formulation of the I-E-O model to guide leaders in higher education in standardizing assessment practices came during an era of heightened attention to reporting practices and accreditation mandates following the publication of *A Nation at Risk* (National Commission on Excellence in Education, 1991). The report by the U.S. Department of Education addressed deficiencies in

curriculum content, academic rigors, faculty preparation, and the recruitment of teachers (National Commission on Excellence in Education, 1983). The I-E-O model has since been referenced as a foundational template for programmatic and institutional assessment in higher education.

Astin (1991) extended the application of the I-E-O model to provide college leaders the lens from which to view student outcomes assessment in higher education through an examination of the student input, the environment, and student outcomes to achieve a more comprehensive and exhaustive analysis of interacting and confounding factors that influence whether students succeed. One evolution in the assessment process was formulated in Astin's (1991) critical appraisal of the tendency to assign a cause-and-effect relationship between student outcomes and the environment of the educational program or curriculum. For example, measuring student performance at the end of a program to evaluate the impact or effectiveness of the program, without the knowledge of how student inputs differed prior to the intervention, is an incomplete measure of the program's effectiveness. Therefore, Astin advocated for the use of pretests to measure the student inputs prior to an educational intervention to mitigate faulty assumptions about the cause of the measured outcomes for any relationship to the intervention that was provided.

Astin (1991) emphasized the pervasive nature of the assessment process in U.S. higher education to achieve excellence in both policy and practice. The aspiration of excellence extends beyond academic achievement and degree completion; it reaches to public policy and accountability. College administrators are building on Astin's model to

further advance institutional assessment practices and inform educational policy (Fike & Fike, 2008; York et al., 2015). One reason for heightened assessment practices is the growing demand for compulsory reporting and accountability to accrediting bodies at the programmatic and institutional levels which underlines the value of effective assessment methods. Performance-based funding plans at higher education institutions further drive the need to analyze completion data for all academic programs and student populations to accurately interpret student outcomes (Juszkiewicz, 2020; York et al., 2015).

The applications of Astin's (1991) assessment approach are far reaching to the gamut of college departments and student services, from pre-admission to career placement, and every stage in between. For example, prior to enrollment, the admissions personnel may collect student input data such as high school grade point average or American College Test scores as criteria for selective admissions programs; educational staff collect and analyze formative data to track student learning and faculty performance; and institutional leaders track numerous outcome data such as retention, completion, and credentialing of graduates to satisfy accrediting and government reporting requirements. Fike and Fike (2008) examined retention trends and the relationship to student characteristics, in the context of Astin's I-E-O model, and they emphasized the interplay of student inputs and the educational environment to the measured outcomes; their conclusion was that data-driven retention efforts can improve student completion outcomes and achieve the larger goal of sustaining an educated workforce.

Accrediting and government bodies require that PTA program directors continuously collect enrollment and completion data for the comprehensive assessment of

the program's effectiveness in achieving the institutional and program objectives. PTA program directors can assimilate the theoretical framework of Astin's (1991) I-E-O model as a guide toward effective PTA program assessment and as a guide for research that informs PTA education. For example, Easley (2016) investigated the student outcomes of PTA program completion and licensure examination success in the context of the I-E-O model to evaluate the effectiveness of admissions testing to predict student retention and licensure exam pass rates. Easley's focus was on the student input of reading level prior to PTA program enrollment. Gresham et al. (2015) examined the institutional and program characteristics (environment) on student outcomes and concluded that total program expenses per graduate and percentage of full-time clinical education influenced program completion.

The I-E-O model is well-suited for a framework in which to quantify the outcome measure of PTA program completion in the context of independent and dependent variables. The input variables in this study included the student's prior college enrollment status and the covariate of ethnicity. The outcome variable was PTA program completion status. This study is useful to PTA educators since it examined the influence of students' prior college enrollment status and ethnicity on the outcome of PTA program completion.

Literature Review Key Concepts

Key concepts of the literature review included community college completion, first-time students, the reverse transfer phenomenon including postbaccalaureate students, history and evolution of physical therapy education, and PTA program outcomes. I

explored published information related to the variable of PTA students' prior college experience of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer and the covariate of ethnicity. Particularly, I focused on the college completion data of these variable attributes related to community college students in general, since very little research is available on PTA student outcomes beyond dissertations that have not been disseminated.

Trends in Community College Completion

Community colleges host programs that prepare students to enter the workforce and meet societal labor demands. For a decade, overall enrollment at these institutions showed a small but steady decline with associate-degree health education programs decreasing 9% between the 2018 and 2019 school years (Juszkiewicz, 2020). The decline in enrollment underlines the importance of retaining those students who enroll by helping them achieve degree completion to ensure an adequate number of graduates are entering the workforce in health careers (U.S. Bureau of Labor Statistics, 2021).

The Integrated Postsecondary Education Data System (IPEDS) defines graduation rates for first-time, full-time degree-seeking students within a particular timeframe such as 100%, 150%, or 200% the usual time to completion; for this study, completion rates represented first-time students who graduated within 150% of the usual time (IPEDS, 2021). A first-time student enrolled in a 2-year program in 2015 who graduated within three years in 2018 is calculated as a completion, whereas a student who was enrolled part-time and required longer than three years to complete an associate degree is not included in completion data as a completion. Therefore, a student who enrolled in 2015

and remained enrolled part-time for 4 years before completing a degree may not be counted as a completion for the cohort of 2015.

Since much of the data that is included in compulsory reporting to accrediting bodies and government agencies reflect the enrollment, retention, and degree completion of first-time college students, this framework of reporting does not account for students who transfer into a community college from a 4-year institution. In fact, much of the standardized completion data that is available for program and institutional assessment lacks a comprehensive representation of student enrollment and completion for all student profiles, and such missing data can cost institutions much needed funding that is allocated based on enrollment and completion numbers (Romano & D'Amico, 2021). Nonetheless, current data on first-time college students provide college leaders and policy makers a glimpse into the trends of student outcomes. Alternatively, the American Association of Community Colleges (AACC) favors a broader approach of outcomes reporting, referred to as the Volunteer Framework of Accountability, in which community college metrics include all entering students, with up to 6-years to complete, and report additional outcomes of student progress, noncredit career training, and adult basic education (AACC, 2011). The extended 6-year framework of reporting is helpful for leaders and policymakers to collect more robust data from which to analyze the relationships of student inputs to the student outcomes which are considered the measure of effectiveness of college programs. The 6-year retrospective looks at college enrollments and completions are also used by researchers at the National Student Clearinghouse (NSC) who collect national and state level data to provide educational

reporting and data exchange for policy and planning purposes involving 3,600 colleges and universities (NSC, 2022). The NSC reports and publications address educational outcomes data that cross different institutions, and students who attend more than one institution are tracked to completion, sometimes in an extended 8-year completion rate.

First-time College Students

From 2017 to 2019, enrollment of first-time college students in public 2-year institutions showed a slight but steady downward trend with greater drops in enrollment by men versus women and by adults over the age of 24 years than students aged 18 to 24 years (Juszkiewicz, 2020). Amongst all types of institutions of higher education, enrollment in associate-degree programs showed the greatest decrease from 2017 to 2019, with a 2.8% decline from 2018 to 2019, following a 2.0% decline from 2017 to 2018. Specifically, health professions suffered a 9.0% decline in associate-degree enrollment between the 2018 and 2019 school years (Juszkiewicz, 2020).

Once enrolled, first-time college students face many challenges to persistence and completion of their degree. The completion rates of first-time college students who began at a community college in 2012 were tracked through the NSC for a 6-year outcome, and the total completion was 39.2% by 2018, including students who finished their degree at a different institution (Shapiro et al., 2019b). Student attrition has far-reaching negative consequences that range from the individual failure to achieve educational credentials, to the institutional impacts of lost enrollments (Cohen et al., 2014). In a health program where administrators use a selective admissions process, the attrition of even a small number of students from the program can result in shortfalls in revenues amidst a tightly

managed budget plan, and many specialized accrediting commissions impose high standards of retention and completion for programs and institutions which may result in sanctions if benchmarks are not achieved (Burnett, 2021). Due to the high completion targets, institutional and program leaders carefully analyze pre-enrollment student inputs, such as grade point average and standardized testing scores, for any correlation to program outcomes to guide the admissions and enrollment policies.

Minority and Low-Income Students

Educational administrators and policymakers regularly perform analytics of outcomes data to examine how well community colleges fulfill the mission to be an access point to higher education for students across all demographics (Astin, 2012; Cohen et al., 2014). A 2-year college degree can mean upward economic mobility for ethnically diverse or low-income students who otherwise have limited earning potential, with annual salaries for associate degree earners approximately $10,000 higher than individuals with only a high school diploma (U.S. Bureau of Labor Statistics, 2019). The difference between minority students and nonminority students in community college completion rates is one type of completion gap that has been addressed in government initiatives, namely the 2010 Completion Agenda of the Obama Administration (Lee et al., 2011). Components of the initiative included the call to increase access to higher education for minority students via simplified financial aid policies and a focus by higher education institutions to assist minority students by providing augmented support services that are aimed at improving developmental academic preparation to improve degree attainment (Lee et al., 2011; Phillips & Horowitz, 2014). The focused attention on degree

completion following the bold agenda declaration appears to have materialized; completion rates at 2-year institutions steadily increased from 25.2% in 2010 to 28.6% in 2015, with the highest completion amongst fulltime, nonfirst-time students (Juszkiewicz, 2020). Despite improvements in completion rates, underserved populations remained disproportionately low in the numbers of degree earners.

Researchers with the NSC analyzed the 6-year outcomes data of community college students who enrolled in 2012 and they confirmed that there are ongoing completion gaps of African American students compared to White students who were enrolled as first-time degree seeking students (Juszkiewicz, 2020). Overall, the completion rate for African American students was 29% while the completion rate for White students was 49% (Juszkiewicz, 2020). Students who enrolled in 2014 were measured in 2020 for a 6-year completion rate. White students maintained a 49% completion rate, African American students dropped slightly to 28%, Hispanic students showed a 36% completion rate, and Asian students held the highest completion rate at 51% (Causey et al., 2020b).

Several factors have been widely discussed in the literature to explain the lower completion rates of minority and/or low-income students compared to non-minority or non-low-income students (Dickson & Zafereo, 2021; Juszkiewicz, 2020; Mukherjee et al., 2017). Low-income students who are pursuing financial mobility by way of a college degree may work more hours than other students to pay for college expenses which interferes with the time they can commit to academic demands (Mukherjee et al., 2017). The need for financial resources may explain why increased access to financial aid,

including student loans, is associated with increased retention and completion amongst minority students (Price & Lincoln, 2018), while financial hardships are associated with increased attrition (Redford & Hoyer, 2018). Unfortunately, minority and low-income students who borrow student loans to attend college but do not complete a degree may end up in a worse economic position than before enrolling in the community college due to accruing student debt burdens (Gladieux & Perna, 2005; Luna-Torres et al., 2018).

Fike and Fike (2008) concluded that minority and/or low-income students comprise a higher proportion of first-generation college students, and their study of 9,200 Texas community college students showed that nearly 75% of first-time college students were also first-generation students. Although first-generation students display a higher level of enjoyment for attending college than non-first-generation students, the first-generation students lack the same confidence level, which may impede persistence and completion (Levitz, 2015). This lack of confidence may stem from not having a parent with the lived experience of college success (Fike & Fike, 2008).

Working Adult Students

One of the contemporary roles of community colleges is to provide access to career technical education and developmental college coursework for transferring to universities, thus paving the way for upward economic mobility for students who are underprepared for a direct trajectory from high school to university; the pathways mapped out by community colleges also serve working adult students who are pursuing career training for the first-time or are aspiring to obtain better-paying occupational opportunities (Cohen et al., 2014). Adult students are more likely to be struggling to

balance the demands of work, family, and financial obligations, and these burdens challenge the journey to completion. Mukherjee et al. (2017) surveyed 1400 community college students in Texas to determine how financial habits, stress, and well-being differed between working and nonworking students and how this difference affected college persistence toward completion. Their results indicated that students who report higher financial stress and lower financial well-being doubt their ability to complete a degree and these students engage in behaviors, such as reducing credit course load or stepping out for a semester, that often result in permanent dropout. Working adult students may be more likely to attend college part-time than traditional age college students, and part-time attendance is correlated to a higher dropout rate than full time attendance (Mukherjee et al., 2017). In 2018, the 6-year completion rate for community college students over the age of 24 years was 35% compared to 44% for students under the age of 20 years (Juszkiewicz, 2020). In 2020, the 6-year completion rate of students who enrolled in 2014 was steady for students over the age of 24 years, but slightly dropped to 43% for younger students under the age of 20 years (Causey et al., 2020b).

Reverse Transfer Students

Early investigation into the trajectory of university students who chose to reverse transfer to community colleges became noteworthy in the 1970s. Heinze (1970) focused on the utility of community colleges as an option for students who were not successful in the 4-year institutions; at that time, the proportion of community college students who had been previously enrolled in a 4-year college was over 9% (Heinze, 1970). Kuznik et al. (1973) evaluated the reasons that students transferred from a university to a

community college, and he found that the reasons included: (a) academic difficulty at the university, (b) focused vocational training available at the community college, (c) closer proximity to home, and (d) lower tuition. These reasons for attending community colleges remain central to the overall mission of community colleges.

Some College No Degree

At the turn of the century, reverse transfer students were investigated across many states. Winter et al. (2001) surveyed community college students across Kentucky, and he classified the participants as completers or noncompleters referring to their baccalaureate status prior to enrolling in the community college. The non-degree completers indicated that their purposes for making a reverse transfer to a community college prior to completing the bachelor's degree included a shift in importance in earning an associate degree rather than a bachelor's degree for improving basic skills, improving college GPA, and earning academic credits for transfer; whereas the degree completers transferred to pursue a career change and attend college closer to home. Reverse transfer students who had some college no degree was an average age of 29 years, which was much younger than postbaccalaureate students who were an average age of 37 years (Winter et al., 2001).

Shankster (2015) investigated the demographic characteristics of 700,000 residents of Washington state who had been previously enrolled in college but did not complete a degree; one in five residents of Washington who were aged 17 to 54 years were included in this some college no degree designation. The ethnicity of the students in the sample population was reflective of the distribution in the general population.

Shankster (2015) concluded that the credits earned without a degree did not improve earning potential for these former students, yet 40% had student loan debt. Most former students had over one year of academic credits. Haas and Hadjar (2020) concluded that students who made a reverse transfer from a 4-year to a 2-year institution prior to degree completion were most often students from low social origin, and they concluded that minority students have more dropouts, interruptions, and reverse transfers without completion than non-minority students.

To offset the negative financial consequences of an unfinished bachelor's degree, state education policies have been implemented to assist students by awarding an associate degree from the college credits that they have earned (Anderson & Education Commission of the States, 2015; Taylor & Giani, 2019). In this context, the term, reverse transfer, extends beyond the direction of college trajectory and applies to an intentional recruitment of students with some college credits to evaluate their earned credits and confer an associate degree (Rockey et al., 2018; Taylor, 2016). Collaborative programs between state community colleges and universities benefit students who did not earn a 4-year degree but need a workforce credential to achieve economic success.

In 2019 the number of students in the United States who had attended college but did not earn a degree reached 36 million, which was increased from 29 million in 2014; and multiple government agencies are pushing for initiatives to engage these former students, with an average age of 42 years, to return and complete a degree (Shapiro et al., 2019a; State News Service, 2021). Former students who do return to complete a degree are likely to do so at a community college. African American and Hispanic students

comprise 36% of students who return and complete an associate degree, but African American and Hispanic students comprise only 23% of students in the general college student population who have not stopped out of college (Shapiro et al., 2019a). The higher rates of university attrition by African American and Hispanic students may contribute to the higher proportion of community college enrollment by students of these ethnicities.

Postbaccalaureate Reverse Transfer Students

During the 1990s and at the turn of the 21st century, Townsend published several studies and papers regarding the phenomenon of reverse transfer students who pivoted from a university to a community college, and she homed in on students who completed a bachelor's degree prior to transferring. The term, *postbaccalaureate reverse transfer students* emerged in the literature to distinguish transfer students with a degree from reverse transfer students without a degree, or *undergraduate reverse transfer students* (Townsend & Dever, 1999). A statewide study of postbaccalaureate reverse transfer students was conducted by Townsend and Lambert (1999) who examined data from community colleges in both Tennessee and Maryland. They found that students bring a different aspect of the student experience to the community college classroom since these students had already navigated academic challenges successfully. For some faculty, the postbaccalaureate reverse transfer students represented a highly motivated and self-sufficient learner in the classroom environment, while other faculty reported challenges with the students who were resistant to correction and challenged instructors' teaching methods (Townsend & Lambert, 1999). The authors examined the paradoxical struggle of

having academically successful students in an environment that is mission-focused for providing access and opportunity to less prepared, first-time college students who are seeking career training for upward economic mobility.

Quinley and Quinley (1999) examined the enrollment intentions of postbaccalaureate reverse transfer students in a North Carolina community college and concluded that most students are seeking a career change or a credential that is a more direct gateway to employment than their baccalaureate degree. For these students, the reverse transfer to a community college is considered a "second chance" to successfully enter a desired workforce industry (Quinley & Quinley, 1999, p.44). Barnes and Robinson (1999) investigated the phenomenon of postbaccalaureate reverse transfer students in the state of Missouri, where they determined that 5% of recent bachelor's degree earners were enrolled in a community college for additional technical training soon after earning the bachelor's degree, suggesting that these students made a change in career choice.

Townsend (2000) analyzed the rise of postbaccalaureate reverse transfer students in the context of the mission of community colleges to provide access to first-time, underserved, and less-prepared students than the university-bound students. Townsend (2000) critically evaluated the impact of postbaccalaureate students on the enrollment trends of associate degree health care professions such as nursing and physical therapist assisting that often use selective admissions criteria, warning that an increase in the number of postbaccalaureate students applying to these programs could overshadow the enrollment opportunity for first-time college students. A significant number of

postbaccalaureate reverse transfer students pursue an associate degree only after their aspirations for graduate school remain out of reach by failing to meet admissions requirements for acceptance to their chosen graduate program (Wu & Lewis, 2019). Students who are seeking acceptance to graduate programs such as physical therapy, occupational therapy, and athletic training commonly declare the undergraduate major of exercise science. Wattles (2001) warned of the poor employment outlook for the exercise science major 20 years ago; students are left holding an unemployable credential, and they often enroll in a community college for workforce training, typically in a PTA program.

Philippe and Valiga (2000) reported that approximately 25% of all enrolled community college students had already earned a bachelor's degree, but not all these students are seeking a degree. Rather, some students are gaining job-related skills or seeking personal development to augment their prior-earned degree. More recently, Friedel and Friesleben (2017) characterized postbaccalaureate reverse transfer students in Iowa and found the most common 2-year programs that they enrolled in were the health science careers and technology. In West Virginia, only 1% of students reverse transferred from a four-year institution to a 2-year institution (Treadway & West Virginia Higher Education Policy Commission, 2019).

Postbaccalaureate reverse transfer students face negative financial consequences when they delay workforce entry after earning a bachelor's degree to enroll in an associate degree (Vaartstra et al., 2017). The delay in seeking gainful employment while remaining enrolled in an additional degree program often results in increased student debt

burdens and lasting negative economic impacts for the student (Dortch, 2018; Fincher, 2017). Postbaccalaureate students who rely on financial aid are not eligible for Pell Grant funding of the associate degree which adds to financial stress, a factor that reduces completion rates when compared to first-time college students with no pre-existing college debt (Dortch, 2018; Mukherjee et al., 2017). However, Shortlidge et al. (2019) concluded that postbaccalaureate students perform significantly better than first-time college students in undergraduate STEM courses and attributed their success to experience in knowing how to succeed in the classroom. Similarly, Forgey et al. (2020) linked success in general education anatomy courses to prior academic success, such as a previously earned degree.

Physical Therapist Assistant Education

Physical therapy is a healthcare profession that provides individuals with the services necessary to improve their quality of life through safe and efficient mobility and function. Physical therapists (PT) are licensed clinicians who diagnose the impairments that result from disease, injury, and congenital conditions, develop a goal-oriented treatment plan, and implement the selected treatment interventions (American Physical Therapy Association [APTA], 2021). The educational requirements for PTs have evolved considerably since PT education was formalized in the 1960s at the bachelor's degree level; by the 1990s, a professional master's degree was an option for entry-level practice and some programs were introducing doctoral preparation (APTA, 2021). Currently, the required entry-level credential for all PTs is the Doctor of Physical Therapy (DPT) degree (CAPTE, 2020d).

PTs may delegate and supervise part of the treatment plan and interventions to PTAs. PTAs are required to earn an associate degree in physical therapist assisting and pass a national licensure exam. The role of PTAs was developed fifty years ago in response to the need for PTs to have support personnel to assist in treating patients. The first 15 PTA students graduated in 1969 from PTA programs in Miami Dade College in Florida and St. Mary's Campus of the College of St. Catherine in Minnesota (Clynch, 2016; Wojciechowski, 2019). The required education for the first PTAs in 1969 was an associate degree and the credential remains unchanged after more than fifty years, unlike the degree for PTs which steadily evolved from the bachelor's degree to a doctorate.

For decades, stakeholders have debated whether to increase the education of PTAs from the current associate degree to a bachelor's degree to give PTAs increased knowledge and critical thinking skills required to perform job duties in an evolving healthcare system (Carpenter-Davis, 2003). Stakeholders who oppose increasing the entry-level degree of PTAs contend that the increased cost of four years versus two years is not justified (Dougherty, 2014). Another barrier to transitioning PTA education to a bachelor's degree is the reality that one-third of all PTA students already have earned a bachelor's degree prior to enrolling in a PTA program and leaders in PTA education suspect that students will not enroll in an additional 4-year program (CAPTE, 2020a). One reason for this enrollment pattern is the highly selective admissions process in DPT programs, which leaves many unsuccessful DPT applicants holding an unemployable bachelor's degree in an undergraduate major such as exercise science (Wattles, 2001).

These postbaccalaureate students often make a reverse transfer to a community college to earn a PTA degree to enter the physical therapy profession as a licensed PTA.

An estimated 10% of PTAs aspire to pursue the DPT credential in a doctoral program after first becoming licensed as a PTA (APTA, 2021). Once licensed as a PTA, students who also hold a bachelor's degree in another major can enroll in a graduate, PTA-to-DPT bridge program that has a curricular design specific for building upon the PTA's educational background. For PTAs, the bridge program option is more attractive than the traditional DPT curriculum since redundant theoretical and technical physical therapy coursework already taken in the associate degree PTA program would not need to be taken. For PTAs without a bachelor's degree, the linear path to a career as a DPT would consist of earning an associate of applied science degree in PTA, then a bachelor's degree in a science-focused major such as exercise science, kinesiology, or biology through a degree completion program, then culminate with a DPT degree. Typically, this stackable credential pathway is not the common pipeline to the DPT degree since there are only two PTA-to-DPT bridge programs in the United States and few degree completion programs contain the needed prerequisites of the DPT programs. This misalignment of courses results in students taking more college courses than needed for a bachelor's degree to fulfill admissions requirements.

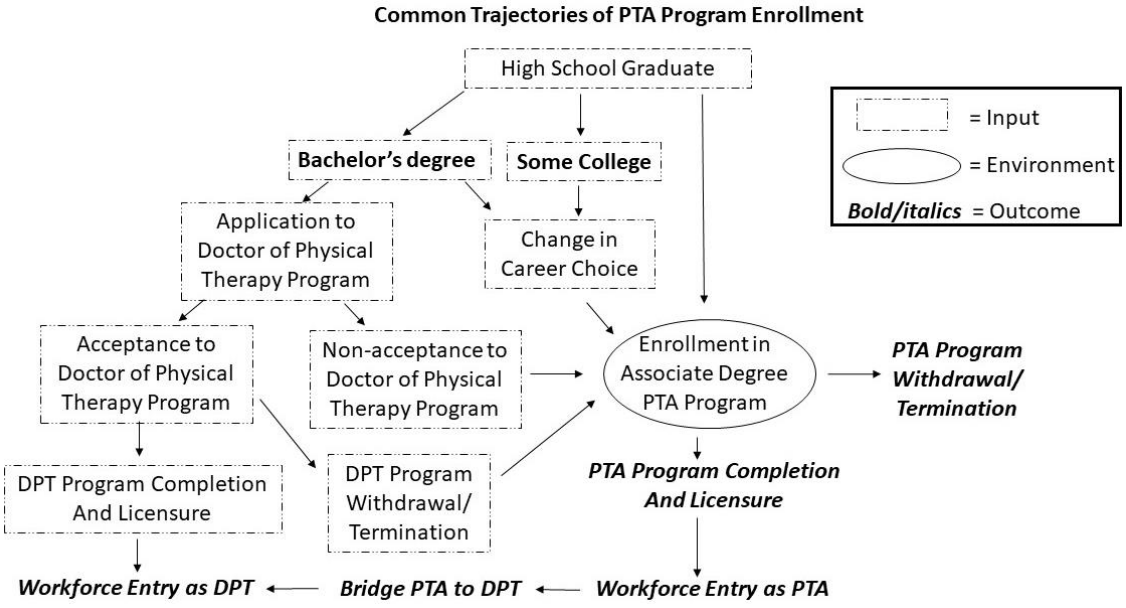
Instead, most students attempt the goal of achieving entry into a DPT program by first enrolling in a 4-year university to complete a bachelor's degree. However, since the ratio of the number of applicants to available seats in DPT programs is approximately 5:1 (CAPTE, 2020c), many unsuccessful applicants to DPT programs pivot to the community

college to earn an additional PTA degree. One of the negative consequences of PTA students earning excessive credits or degrees prior to enrolling in a PTA program is that PTA graduates accrue an average student debt of $24,308 which is more than the national average of community college student debt of $20,000 (APTA, 2020).

Figure 1 is a concept map of the various trajectories of PTA students, conceptualized in the framework of Astin's I-E-O model where prior college enrollment status is an input (I), the PTA program enrollment is the environment (E), and the PTA program completion status is the outcome (O). Numerous prior college experiences are common for students who enroll in a PTA program. Some students seek a credential in PTA as a second career path, while others enroll immediately after high school.

Figure 1

Trajectories of PTA Program Enrollment



PTA Program Outcomes

Stakeholders in physical therapy education have prioritized a research agenda to build unified data sets that represent key metrics for analyzing education outcomes (Jensen et al., 2016). A portion of the education data that are currently available is derived from CAPTE aggregate reports that are published annually. Each year, PTA program directors submit an annual accreditation report (AAR) to CAPTE that is comprised of institutional, programmatic, and student level data, including enrollment and completion outcomes. The data are compiled into an aggregate data report by CAPTE and is publicly available (CAPTE, 2021b). The types of student level enrollment data that are reported by program directors include student age, gender, ethnicity, and prior degree status. The national PTA program enrollment and demographics in 2019 are displayed in Table 1 for total number of students, gender, prior bachelor's degree, and ethnicity.

Table 1

U.S. PTA Program Enrollment in 2019

Total students	Proportion of female students	Proportion of students with prior bachelor's degree	Proportion of minority enrollment
12,478	64.5%	34.7%	32.4%

Note. From *PTA program aggregate data* by, Commission for the Accreditation of Physical Therapy Education, 2020 (http://www.capteonline.org/uploadedFiles/CAPTEorg/About_CAPTE/Resources/Aggregate_Program_Data/AggregateProgramData_PTAPrograms.pdf)

The student level enrollment (input) factors that are reported by PTA program directors on the AAR do not directly align with the completion (outcome) factors that are reported. For example, the number of postbaccalaureate students who enroll in PTA programs is reported, but the number of postbaccalaureate students who complete the program is not reported. The gender of students who enroll is reported, but the gender of students who graduate is not reported. The only outcomes which are reported in direct comparison to enrollment inputs are by student ethnicity. Since outcomes are reported in the year following the expected graduation, the reporting process accounts for the delayed graduation of students who may have had to repeat a course or clinical experience, and completion is defined as graduating within 150% of the program length (CAPTE, 2020a). Therefore, in 2020, PTA program directors reported on PTA program graduate data for 2019 which reflected those students who enrolled in 2017. Table 2 displays the national enrollment outcomes of the 2017 cohort, by ethnicity. Based on the data in Table 2, completion rates of the 2017 cohort showed an attrition by African American, Hawaiian Native/Pacific Islander, White, and unknown groups, while Asian and Hispanic/Latino students increased in proportion of completers compared to the proportion at enrollment.

Table 2

National PTA Program Enrollment and Completion, by Ethnicity (%) for 2017to 2019

Ethnicity	Enrolled in 2017	Completed in 2019 (or 150% program length)
African American	6.4%	5.9%
American Indian/Alaskan Native	0.6%	0.6%
Asian	5.0%	5.7%
Hawaiian Native/Pacific Islander	0.9%	0.8%
Hispanic/Latino	10.8%	12.8%
White	71.9%	70.8%
Other	2.4%	2.4%
Unknown	1.6%	1.1%

Note. From *PTA program aggregate data* by, Commission for the Accreditation of Physical Therapy Education, 2020 (http://www.capteonline.org/uploadedFiles/CAPTEorg/About_CAPTE/Resources/Aggregate_Program_Data/AggregateProgramData_PTAPrograms.pdf)

CAPTE defines a PTA program completion as a student who completed an associate of applied science degree in PTA in 150% of the program length (CAPTE, 2021b). In 2019, the CAPTE formula for calculating completion rates changed to exclude voluntary, nonacademic withdrawals from the PTA program (CAPTE, 2021b). Due to the modified method of calculating completion, the actual completion rates of all enrolled students may have been lower than the reported figures beginning in 2019. Overall completion rates in PTA programs showed a downward trend from 2014 to 2019, and the programs in one Midwestern state showed a similar downward trend, with an overall completion rate below national averages, as displayed in Table 3.

Table 3

PTA Program Completion Rates per CAPTE Aggregate Data Report

		2014	2015	2016	2017	2018	2019
National completion rates	mean	85.7	86.3	85.4	86.5	83.7	83.4
	range	25-100	46.2-100	45-100	45.5-100	41.7-100	43.7-100
Midwestern state completion rates	mean	84.4	85.0	89.0	81.2	80.9	78.1
	range	62.1-100	64-100	81-100	56.7-100	66.7-97.7	50-96.7

Note. From *PTA program aggregate data* by, Commission for the Accreditation of Physical Therapy Education, 2020 (http://www.capteonline.org/uploadedFiles/CAPTEorg/About_CAPTE/Resources/Aggregate_Program_Data/AggregateProgramData_PTAPrograms.pdf)

There are a minimal number of published studies regarding the individual student-level factors that influence PTA program completion. A few studies have examined the student-level (input) predictors of student success on the PTA licensing exam, and other studies were focused on institutional factors (environment) that influence whether students graduate and become licensed PTAs (Desmarais et al., 2011; Easley, 2016; Gresham et al., 2015; Kabiri et al., 2017; Maring et al., 2009; Maring et al., 2013; Sloas et al., 2013). Of these studies, only two were focused on student input factors related to PTA program completion. Kabiri et al. (2017) examined quantitative PTA program admissions criteria and the relationship to academic success for 2,809 PTA students from 31 programs in 24 states, and they concluded that prerequisite GPA, standardized admissions testing, and the course grade in anatomy and physiology were more predictive of program completion than student gender or ethnicity. Easley (2016) analyzed the

relationship of Tennessee PTA students' pre-admission reading level, per the Nelson-Denny, as an input variable in the context of Astin's I-E-O model; reading level was a stronger predictor of completion and licensing exam success than the students' PTA program GPA. Overall, the consistent predictors of academic success were students' academic performance in prerequisite coursework prior to enrolling in a PTA program and grade point average in the early PTA science courses such as anatomy and physiology. According to the limited research studies, race and ethnicity were not determined to be significant factors for predicting successful completion of a PTA program (Kabiri et al., 2017). But these findings are inconsistent with the lower completion rates amongst African American, Hawaiian Native/Pacific Islander, and White students contained in the published aggregate national program data reports, displayed in Table 2 (CAPTE, 2020a).

Garber (2017) reported that, for PTA students, a prior earned degree has been associated with higher scores in first-term anatomy courses, but little is known about the impact of a prior earned degree on PTA program completion. For PTAs who have already earned a bachelor's degree or earned high numbers of college credits, the additional cost of an associate degree to enter the physical therapy profession is expected to extend the financial stress for these students while enrolled in a PTA program and this stress may negatively impact degree completion (APTA, 2020).

Similar challenges in enrollment and retention exist in other associate degree health programs, and evidence from these related fields can inform research for PTA education. In a study of the retention of associate-degree dental hygiene students,

Sanderson (2014) found that the preadmission factors of high school grade point average, interviews, and overall college grade point average showed predictive validity in projecting completion. For nontraditional nursing students, Priode et al. (2020) found that financial burdens accounted for a significant portion of nonacademic factors that led to students leaving the nursing program without a credential. For respiratory therapy students, Ari (2009) concluded that institutional factors such as the amount of program resources (faculty, clinical, personnel) that were provided to students was correlated to student retention.

Summary and Conclusions

Little research is available to determine how PTA students' prior college enrollment status predicts PTA program completion. A growing number of students who enrolled in PTA programs had earned credits or a degree at a 4-year institution before they enrolled in a 2-year PTA program, and there is evidence that these reverse transfer students experience obstacles to completing their PTA degree. Student ethnicity may also influence whether a student completes the PTA program, with the greatest achievement gap amongst African American students. The present study contributed to knowledge in PTA education on the relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer on PTA program completion status, while controlling for ethnicity.

This chapter contained a review of the literature that included the variables that were studied. These variables included the PTA students' prior college enrollment status, ethnicity, and completion status. First-time college students were discussed, and current

enrollment and completion trends were provided. The phenomenon of reverse transfer students, both postbaccalaureate degree earners and students with some college no degree, were defined and described. The completion rates for community college students were compared by ethnicity, including the specific differences amongst PTA students. A history of PTA education and the contemporary issues facing PTA educators were presented.

In chapter 3, the research methods of this study are provided, starting with the research design and rationale. The methodology is presented, including the population; sampling procedures; the recruitment, participation, and collection procedures; and the data analysis plan. Threats to validity are examined, and ethical considerations for recruitment and data collection are discussed.

Chapter 3: Research Method

Introduction

The purpose of this causal comparative study was to determine if students' prior college enrollment status predicts PTA program completion, while controlling for ethnicity. To evaluate the relationship between the PTA student's prior college experience and the completion of a PTA program I used the prior college enrollment status of: (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer as the predictor variable. Chapter 3 includes a discussion of the research design and rationale including the independent and dependent variables, the constraints of time and resources with the design choice, and the justification for the design choice to advance knowledge in PTA education. A detailed explanation of the methodology follows and includes the population selection and sampling procedures, the data collection tools and techniques, and the rationale for using archival data. The data analysis plan contains the statistical tests that were used to test the hypotheses and how the results were analyzed and interpreted in the context of the assumptions of the tests. I address the threats to validity and describe the ethical procedures.

Research Design and Rationale

I conducted this study using a quantitative methodology and a causal comparative design to address the problem and research question. A causal comparative design is useful to determine the relationships between the independent and dependent variables by comparing two or more groups of individuals. This research design can be used to answer the research question, to what extent is there a predictive relationship between a PTA

student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and PTA program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state. The independent categorical variable was the PTA student's prior college enrollment status which was defined as either: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer. The dichotomous dependent variable was the PTA student's program completion status and was coded as completed or not completed. Differences in PTA program completion by ethnicity is verified by data in the 2020 Commission for the Accreditation of Physical Therapy Education (CAPTE) PTA program aggregate data report (CAPTE, 2020a). Therefore, student ethnicity served as the covariate in the binary logistics regression model to predict the relationship between a student's prior college enrollment status and PTA program completion status. Student ethnicity was coded per the CAPTE reporting conventions and included, African American, American Indian/Alaskan Native, Asian, Hawaiian Native/Pacific Islander, Hispanic/Latino, White, Other, and Unknown (CAPTE, 2021b).

There were minimal time and resource constraints associated with data collection and analysis in this causal comparative research design. Archived data were collected by study participants and submitted to me electronically. No travel, face-to-face interviews, or other time or cost-prohibitive methods were needed to complete the study. To advance knowledge in PTA education, empirical evidence is needed to add to existing peer-reviewed literature to advance the effectiveness of the recruitment, retention, and credentialing of a skilled physical therapy workforce.

Methodology

In this study I used a quantitative methodology for gathering and analyzing archived data collected from three participating PTA program directors in one Midwestern state. A quantitative methodology is essential for the analysis of empirical data. Researchers can use an empirical epistemology and positivist ontology rooted in Comte's (1856) framework of positivity in the study of natural phenomena as the context for interpreting observations of relationships in terms of empirical data. This nonexperimental study included a retrospective analysis of deidentified student level data to make interpretations about the relationships between predictor variables and an outcome variable. A binary logistics regression analysis was used to analyze the independent variable, prior college enrollment status of: (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer, for any relationships to the dichotomous dependent variable, PTA program completion status, and included the covariate of ethnicity.

Archived PTA program data are readily available and routinely managed by program directors for annual reporting purposes as well as periodic and pervasive programmatic assessment (CAPTE, 2020b, CAPTE, 2021b). I reviewed archived data for PTA students who were enrolled between 2014 and 2019. Since the accreditation cycle for PTA programs is 10 years, PTA program directors are expected to maintain these records for a decade (CAPTE, 2020b) but this timeframe may have been a constraint if PTA program directors had not retained records for the full period. The results of this study add to previous studies in PTA education which have included a quantitative

methodology and causal comparative design to analyze input and environment factors that influence or explain the outcomes of program completion and successful credentialing.

Population

The population for this study was U.S. PTA students. Nationally, more than 12,000 students enroll in PTA programs each year (CAPTE, 2020a). A convenience sample of PTA students from three target institutions in a Midwestern state was used to answer the research question, to what extent is there a predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and PTA program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state. Voluntary participation was confirmed by program directors and institutional leaders to provide deidentified student-level data.

Sampling and Sampling Procedures

From 2014 to 2019, there was an average of 356 PTA programs in the United States, with an average annual enrollment of 12,742 students nationwide (CAPTE, 2020a). In one Midwestern state with a high concentration of PTA programs, the average annual enrollment was 842 students (CAPTE, 2020a); and the PTA students in this Midwestern state served as the sample population for this study. Due to convenience and accessibility to the PTA program directors at the three target institutions, I selected three PTA programs in the Midwestern state to participate as the study sample. Therefore, the sampling method was nonprobabilistic since all PTA programs in the United States did

not have an equal chance of being selected for the sample, nor did all PTA programs in the target state have an equal, random chance of being selected. Rather, the selection of PTA programs that were included was the result of convenience, based on the PTA program directors who reported an interest in participating in the study. Convenience sampling is useful in small-scale studies such as pilot studies, but there are limitations to the generalizability of results, since the data may not be representative of the overall population (Warner, 2013). In this study, the convenience sample of deidentified student level data from three PTA programs in a Midwestern state has limited generalizability to all PTA students in the state, and even less generalizability to all PTA students in the United States.

The total sample size from the three institutions was 548 students for the 6-year target dates from 2014 to 2019, which represented an average PTA program class size of 23 enrollments per year. This sample size met the minimum of 77 students calculated through G*Power for a study with a medium effect size, power at 0.80, and three predictor variable categories; first-time college, some college no degree, and postbaccalaureate reverse transfer (Faul et al., 2009). Another method for determining sample size is 10 times as many cases as independent variables, with few or zero cells containing values < 5 (Peduzzi et al., 1996). With one independent variable and one covariate, the sample size requirement was met.

The sample size of 548 cases exceeded the G*Power calculation of 77 cases required for the analysis. The model included all 548 cases to reduce the likelihood of a Type I error of rejecting the null hypothesis when the null is true. In binary logistics

regression, maximum likelihood estimation is used to estimate model coefficients, and reliability improves when the number of observed combinations of scores on predictor variables increases (Warner, 2013). The low number of some ethnic groups in the sample would be problematic to the Chi-Square tests which are more statistically accurate when cell counts are > 5. Another benefit of including all 548 cases is reducing the risk of a Type II error by not rejecting the null when the null is false since increasing the sample size reduces the risk of a Type II error (Babbie, 2019).

Procedures for Recruitment, Participation, and Data Collection

I recruited participants through email communication with PTA program directors, whose contact information is publicly available online in the CAPTE directory of programs (CAPTE, 2021a). I provided the prospective participants an overview of the study's purpose, research question, and the types of data being collected. The program directors who expressed an interest in participating obtained permission from institutional administrators to report deidentified student level data and signed a data use agreement. One partner site required an internal research review approval prior to data collection. The data collection tool was a fillable spreadsheet that I provided to the paticipants electronically. Instructions for reporting student data was given in written format to ensure uniform reporting across the three partner sites. Variables included deidentified student level data for student ethnicity, per the ethnicity nomenclature used in CAPTE reporting (Table 4); prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer; and enrollment outcome

coded as completed or not completed. A sample spreadsheet entry is displayed in Figure 2.

Figure 2

Student Level Data Spreadsheet

Student ID	Year student enrolled in PTA program	Ethnicity* 1= AI/AN,2= AS, 3=BL/AA, 4=HI/LA, 5=NH/PI, 6=2+, 7=UN, 8=WH/CA	Pre-PTA Program Enrollment Status[t] (FTC=0, SCND=1, PRT=2)	PTA Program Completion Status (did not complete=0, completed =1)
639	2019	8	0	0
640	2019	8	0	1

Operationalization of Variables

Student ethnicity is self-reported by students during the college admissions process. The definitions of race and ethnicity are established by the Integrated Postsecondary Education Data System (IPEDS) and the current definitions were established in 1997 (IPEDS, n.d.). CAPTE requests information from program directors in annual accreditation reports (AAR) using a slightly different nomenclature and is clarified in Table 4 with a comparison to the IPEDS nomenclature. For this study, the ethnicity of PTA students was defined by the CAPTE nomenclature since the data are reported in PTA program AARs and can be analyzed using consistent language between PTA programs.

Table 4

Comparison of Ethnicity Nomenclature for IPEDS and CAPTE

IPEDS*	CAPTE**
Hispanic or Latino	Hispanic/Latino
American Indian or Alaska Native	American Indian/Alaska Native
Asian	Asian
Black or African American	African American
Native Hawaiian or Other Pacific Islander	Native Hawaiian/Other Pacific Islander
White	White
Nonresident alien	Two or more races
Resident alien (and other eligible non-citizens)	Unknown
Race/ethnicity unknown	

Note. *From Integrated Postsecondary Education Data System (IPEDS) (n.d.). Definitions for new race and ethnicity categories. (https://nces.ed.gov/ipeds/report-your-data/race-ethnicity-definitions)

** From Standards and required elements for accreditation of physical therapist assistant education programs by Commission for the Accreditation of Physical Therapy Education, 2020 (https://pta-standards-and-required-elements.pdf)

The prior college enrollment status of PTA students was separated into the three classifications of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer. First-time college referred to students who have not earned credits at another institution prior to applying to the PTA program. Some PTA programs require prerequisite course work before being officially accepted into the PTA program. The completion of the prerequisite courses did not alter the student's classification as first-time college, since those course credits were included in the student's pursuit of the associate degree in PTA. Some college no degree referred to

students who attended college for a different career path but did not complete a degree before transferring to the PTA program, and the classification included students who enrolled in a different program at the same institution where they later enrolled in the PTA program, if they took courses that did not count toward the associate degree in PTA. Students who earned an associate degree prior to enrolling in a PTA program were included in the some college no degree group, since CAPTE does not identify the associate degree as a prior degree in annual reporting. Postbaccalaureate reverse transfer referred to students who completed a bachelor's degree in any field, and from any institution, prior to enrolling in the PTA program.

The dependent variable, PTA program completion status, was coded as a dichotomous variable. There was no differentiation of the reasons a student did not complete, whether it was an academic failure, voluntary withdrawal, or involuntary termination. Therefore, the method used in this study for the determination of completion status differed from the current method that CAPTE employs for calculating a cohort's completion rate (CAPTE, 2021b). In 2019, CAPTE determined that the voluntary withdrawals by students for personal, health, or military reasons would not weigh against a PTA program's completion rate. Personal reasons include anything that prompts a student to leave the program before completion and may include financial hardships, career choice change, or tending to family issues. PTA programs are required to achieve at least 60% completion (CAPTE, 2021b). Further, CAPTE defines successful completion of the PTA program as a student who graduates within 150% of the normal program length.

Students enroll in PTA programs in a cohort, and all students move through the program together. If a student fails a course, they must drop back to the newest cohort and continue with a new class. If a dropped-back student successfully completes the program with the new class, they are calculated in the original cohort's completion data on the AAR. PTA program directors report cohort enrollment and completion on the AAR in December of the year following a cohort's completion. Completion is calculated as follows (G1.3 + G1.4)/(G1.2 – G1.5) where

- G1.3 is the number of students who graduated or are expected to graduate at the normally expected time.
- G1.4 is the number of students who graduated or are expected to graduate within 101% to 150% of program length.
- G1.2 is the number of students admitted to the original cohort of the graduating class of the year being reported on who enrolled in the first term of the professional/technical program.
- G1.5 is the number of students who did not complete the program within 150% of the program length due to nonacademic or clinical deficits (CAPTE, 2021b).

Based on CAPTE's 2019 method of calculation, the only students who count as noncompleters are those who fail academically or clinically. The number of students in the cohort is reduced in the denominator by the number who voluntarily withdrew from the program for personal, health, or military reasons. In this study, all noncompleters were counted as noncompleters, and no adjustment in the denominator was made. The calculation method resulted in a more accurate measure of the completion percentage of

students who enrolled in a PTA program compared to the revised CAPTE method, including students who chose to leave for nonacademic reasons.

Data Analysis Plan

The data in this study were analyzed with the assistance of SPSS 27. Data were screened for accurate coding of student ethnicity, prior college enrollment status, and completion status. There was no missing data.

Research Question (RQ): To what extent is there a predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and PTA program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state?

Null Hypothesis (H_0): There is no predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state.

Alternative Hypothesis (H_1): There is a statistically significant predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state.

The independent variable, prior college enrollment status of: (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer, was analyzed using binary logistic regression for any relationships to the dichotomous dependent variable, PTA program completion status. Binary logistic regression is applicable in a study where the outcome variable is binary, or dichotomous and the goal of the study is to "predict membership in a target group" from the values of the predictor, or independent, variables (Warner, 2013, p.1007). In binary logistic regression, the independent variables are categorical, and a covariate can be included in the model (Warner, 2013). The purpose of this causal comparative study was to determine if students' prior college enrollment status predicts PTA program completion, while controlling for ethnicity.

Several assumptions must be met when using the statistical tests of binary logistic regression which include:

1. The dependent variable is dichotomous.
2. The values of the dependent variable are statistically independent of each other.
3. The categories of the dependent variable must be mutually exclusive; each participant must be a member of only one of the groups.
4. The model must be specific to relevant independent variables, and irrelevant predictors must be excluded (Warner, 2013).

These assumptions are straightforward to assess. The dependent variable is the PTA program completion status which is dichotomous. The values are statistically independent

of each other, and the categories are mutually exclusive. Students either complete the PTA program or they do not complete. No student can belong to both groups. The relevance of the independent variables can be assessed with an examination of the expected frequency of each data cell, with a preferred value of > 5; and extreme outliers should be noted (Warner, 2013). This study did not contain a quantitative predictor variable, so outliers were not problematic. The predictor variable of prior college enrollment status has three classifications: (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer. The proportion of students who were in the postbaccalaureate reverse transfer group was expected to be approximately 34% of the sample, due to national PTA program data (CAPTE, 2020a). Considering the sample size of 548 students, the remaining two classifications of prior college enrollment status were expected to have enough members to satisfy the model with > 5 per cell.

In PTA education, minority students comprise approximately one-third of enrollment (CAPTE, 2020a). Based on recent national aggregate data, there are differences in completion rates based on student ethnicity (see Table 2). Therefore, ethnicity was included in the model as a covariate. The covariate could likely contain data cells with < 5 since some ethnicities are scarcely represented in PTA education. With a sample size of 548 students, the ethnic groups that had less than 1% representation would have a cell value < 5. Based on current national data, American Indian/Alaskan Native and Hawaiian Native/Pacific Islander had the potential to fall below 1% representation (CAPTE, 2020a). Low proportions of these ethnicity categories would

require the combining of the categories into one group to reduce the likelihood of a cell totaling < 5.

Results of the binary logistic regression analysis were interpreted through statistical tests to determine the odds of group membership by the predictor variable and to answer the research question. Statistical significance was assumed at $\alpha < 0.05$. Binary logistic regression uses a logit model, or a log of odds (Warner, 2013). The odds of a PTA student completing the PTA program is the outcome of interest and was coded as 1. The alternative outcome is the PTA student does not complete the program and was coded as 0. The odds, or probability, was calculated by the number of times the outcome of interest happens, divided by the number of times it does not happen (Warner, 2013). Numerically, this equation is expressed as p/(1-p) where p is the probability of the outcome of interest occurring and 1-p is the outcome of interest is not occurring. If students have an equal chance of belonging to the two groups, the odds = 1. If the odds are < 1, the outcome of interest is less likely to happen than the alternate outcome. Conversely, if odds are > 1, the outcome of interest is more likely than the alternative outcome.

An odds ratio compares the odds of PTA program completion between the three groups of students: (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer. This numerical expression is $(odds_1)/(odds_2) = [(p_1/1-p_1)/(p_0/1-p_0)]$. In SPSS, the odds ratio is expressed as Exp(B) (Warner, 2013). This expression reflects the exponential function, or the inverse of natural log which is the operation that transform the odds ratio to a natural logarithm (Warner, 2013). Taking the

natural log of an odds converts it to L_i, called the logit (Warner, 2013). The logit serves as the dependent variable and has more useful properties such as normal distribution and linearity than the odds ratio (Warner, 2013). Binary logistic regression was used to compare the null, or constant-only model, with the full model. The SPSS test for the null is the WaldX^2 statistic where the null stated mathematically is H_0: B_i=0 and the B coefficient tells by how many units the log odds ratio increases for a unit increase on the X predictor variable (Warner, 2013).

Goodness of fit was assessed with the log-likelihood (LL) function, where the lower the absolute value of LL, the better the model fit (Warner, 2013). Since binary logistic regression models predict probability values instead of scores on the Y axis, like other regression models, SPSS must provide a pseudo *R* value in place of a true multiple *R* value to assess the model's accuracy of prediction (Warner, 2013). Nagelkerke R^2 is a modified version of Cox and Snell R^2 and has a maximum value of 1, making it preferable to the Cox and Snell R^2 for testing goodness of fit for binary logistic regression (Warner, 2013). An omnibus test of model coefficients in SPSS can provide a Chi-Square value to test for the improvement in fit for the full model compared to the null model. A contingency table is another method to assess the accuracy of the model, specifically the group classifications. In this study, there were two outcome groups: (1) completed the PTA program and (2) did not complete the PTA program. The contingency table displays how the predicted group membership corresponded to the actual group membership and the percentage of correctly classified cases can be determined for each group and the full sample (Warner, 2013).

This study was conducted using a quantitative methodology and a causal comparative design to address the problem and research question. A causal comparative design is useful to determine the relationships between the independent and the dependent variables by comparing two or more groups of individuals. Therefore, there was no manipulation of the independent variables. Rather, archived data was analyzed to determine if there is a predictive relationship between the independent variables and the dependent variable. This design does not necessitate an examination of threats to external validity related to testing reactivity, interaction effects of selection and experimental variables, or multiple treatment interference. Similarly, there is no threat to internal validity such as maturation or selection-maturation interaction.

Ethical Procedures

The institutional review board (IRB) application was completed after the proposal for this study was submitted for review and approved with IRB approval number 02-28-22-0997280. Institutional permissions were obtained prior to any formal recruitment of participants for the collection of data. Data was stored securely in electronic format on a password-protected computer and backed up on a password-protected server. Participating PTA program directors were instructed on what data was requested and what procedure I would use to collect and report data. The names and contact information of PTA program directors is required to be published on a PTA program's website (CAPTE, 2021a), so this information is not confidential. However, the names of the programs and institutions that chose to participate in this study are confidential, and that information is held confidential. Following the completion of this study, data will be

stored for 5 years, then will be disposed of through electric file deletion. The privacy of the participants will be maintained in several ways:

- No naming of the participating institution that house the PTA programs whose data are included in the study;
- No naming of the PTA programs or the program directors who assisted in the collection and reporting of data;
- All student level data included on the data collection spreadsheet is deidentified as student 101, student 102, etc. Only aggregate data will be included in the study's data tables, analysis, results, discussion, and conclusion so that individual student data will remain anonymous;
- The state where the study will take place is deidentified as only a Midwestern state.

There are no expected psychological, relational, legal, or economic risks to participants who are reporting commonly used data on PTA program enrollment and completion, nor to the PTA students whose deidentified data was reported. Informed consent has been thoroughly exercised.

Summary

Binary logistic regression was used in this quantitative study using a causal comparative design to analyze whether there is a predictive relationship between a PTA student's prior college enrollment status and PTA program completion status, while controlling for ethnicity. The predictor variable, covariate, and outcome variables were

operationalized in this chapter and the statistical tests that were used were discussed. The data analysis plan was described, and ethical considerations were summarized.

In Chapter 4 I include the data collection methods and data analysis. I also describe Evidence of Trustworthiness and provide a summary of the data analysis, answer the research question, and discuss the results of the study.

Chapter 4: Results

The purpose of this causal comparative study was to determine if students' prior college enrollment status predicts PTA program completion, while controlling for ethnicity. I analyzed the PTA program completion status of students at three target PTA programs in a Midwestern state who enrolled between 2014 and 2019 for the relationship of students' prior college enrollment status on program completion, controlling for ethnicity. I examined the following research question.

Research Question (RQ): To what extent is there a predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and PTA program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state?

Null Hypothesis (H_{01}): There is no predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state.

Alternative Hypothesis (H_{1}): There is a statistically significant predictive relationship between a PTA student's prior college enrollment status of: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state.

In the next section, I include the data collection and variations that occurred from the planned methodology and the results of the binary logistics regression modeling,

Data Collection

Three PTA program directors were recruited by email to participate in the study and 100% responded and agreed. Institutional approval was received, and all necessary IRB approvals were obtained before any data collection occurred. Participating partners in three target PTA programs in a Midwestern state collected data over a 3-week period. The PTA program directors provided the deidentified student-level data for each student who enrolled in their PTA programs between 2014 and 2019. Deidentified student level data were recorded on Excel spreadsheets that I provided in electronic format and included the year enrolled, student ethnicity, prior college enrollment status, and PTA program completion status. Participants were instructed on the nomenclature and parameters of the data to be entered to ensure uniformity of reporting. All participants returned the completed data spreadsheets electronically.

The study sample of PTA programs was representative of U.S. PTA programs regarding the average number of students enrolled in each program per year, with the average cohort size of 23 students. One sample program has two separate campuses and provided data for both campuses, which increased the overall sample size by approximately 40% more than estimated, $N = 548$. The proportion of students who held a bachelor's degree prior to enrolling in a PTA program was lower in the study sample than the U.S. PTA student population. In the United States, the enrollment by postbaccalaureate reverse transfer students has increased every year from 2014 to 2019,

but the sample population showed a decline in the enrollment of postbaccalaureate reverse transfer students between 2014 and 2019. The comparison of the proportion of postbaccalaureate reverse transfer students who enrolled in the three sample schools compared to the population of all U.S. PTA students is displayed in Table 5.

Table 5

Comparison of All U.S. PTA Programs to Sample Population for Proportion of Postbaccalaureate Reverse Transfer Students

	2014 (%)	2015 (%)	2016 (%)	2017 (%)	2018 (%)	2019 (%)
*All U.S. PTA programs**	30.4	31.4	31.6	32.8	33.8	34.7
Sample Midwestern state PTA programs	31.3	16.9	27.3	24.2	16.3	10.6

**Note*. Data on all U.S. PTA programs from *PTA program aggregate data* by, Commission for the Accreditation of Physical Therapy Education, 2020 (http://www.capteonline.org/uploadedFiles/CAPTEorg/About_CAPTE/Resources/Aggregate_Program_Data/AggregateProgramData_PTAPrograms.pdf)

No aggregate data are available to compare the sample population to all U.S. PTA students for the prior college enrollment status of first-time college and some college no degree. The prior college enrollment status of the sample population is summarized per school in Table 6. The schools were disaggregated in the table since the school type (2-year versus 4-year institution) appeared to impact the proportions of the groups of prior college enrollment status. School 1 and School 3 are community colleges and School 2 is

a university. The proportions of the students' prior college enrollment status at the community colleges were very similar to each other.

Table 6

Prior College Enrollment Status of Sample Population, by School, 2014-2019

	Total students	First-time college		Some college no degree		Postbaccalaureate	
		n	%	*n*	%	*n*	%
School 1 Community college	123	44	35.8	50	40.7	29	23.6
School 2 University	268	195	72.8	22	8.2	51	19.0
School 3 Community college	157	56	35.7	64	40.8	37	23.6.0

National aggregate PTA program data verifies differences in PTA program completion by ethnicity (CAPTE, 2020a). Therefore, I included student ethnicity as a covariate in the binary logistics regression model to predict the relationship between a student's prior college enrollment status and PTA program completion status. The proportion of student ethnicities in the sample population is compared to national data in Table 7. Nationally, the proportion of minority student enrollment has steadily increased in PTA programs, but the sample population did not reflect this trend.

Table 7

Comparison of all US PTA Students to Sample Population for Student Ethnicity (%) per Year, 2014-2019

	Year	American Indian/ Alaska Native	Asian	African American	Hispanic/ Latino	Native Hawaiian Pacific Islander	Two or more races	Unknown	White
2014	All U.S. PTA students*	0.6	4.1	5.3	10.1	1.0	1.6	1.3	75.6
	Sample population	1.0	1.0	3.0	4.0	0.0	0.0	0.0	90.9
2015	All U.S. PTA students*	0.6	4.4	5.4	10.6	1.0	1.8	1.7	74.1
	Sample population	0.0	1.1	3.4	1.2	0.0	1.1	0.0	93.3
2016	All U.S. PTA students*	0.6	5.0	6.1	11.3	1.1	2.1	1.8	71.9
	Sample population	0.0	0.0	4.5	1.1	0.0	0.0	0.0	94.3
2017	All U.S. PTA students*	0.6	5.1	6.4	10.8	0.9	2.4	1.6	72.2
	Sample population	0.0	0.0	11.6	3.2	0.0	1.1	1.1	83.2
2018	All U.S. PTA students*	0.5	5.5	6	12.8	1	2.6	1.8	69.8
	Sample population	0.0	2.2	6.5	2.2	0.0	0.0	0.0	89.1
2019	All U.S. PTA students*	0.5	0.5	6.2	14.3	0.6	2.7	1.9	67.9
	Sample population	0.0	0.0	5.9	2.4	1.2	2.4	0.0	87.1

*Note. Data on all U.S. PTA programs from *PTA program aggregate data* by, Commission for the Accreditation of Physical Therapy Education, 2020 (http://www.capteonline.org/uploadedFiles/CAPTEorg/About_CAPTE/Resources/Aggregate_Program_Data/AggregateProgramData_PTAPrograms.pdf)

Results

The study sample from three target PTA programs totaled 548 students and represented four cohorts of PTA students per year. The sample size met the minimum of 77 students calculated through G*Power (Faul et al., 2009) for a study with a medium effect size, power at 0.80, and three predictor variable groups; first-time college, some college no degree, and postbaccalaureate reverse transfer. The outcome variable of

interest was the PTA program completion status for students enrolled between 2014 and 2019 in three target PTA programs in a Midwestern state. The PTA program completion status for the sample population is compared to aggregate data for all U.S. PTA students and is summarized in Table 8. Completion rates declined between 2014 to 2019 for all U.S. PTA students and the sample population, with a greater decline in the sample population.

Table 8

Comparison of All US PTA Students to Sample Population for Program Completion Rates, by Year (%)

	2014	2015	2016	2017	2018	2019
All U.S. PTA students*	85.7	86.3	85.4	86.5	83.7	83.4
Sample population Midwestern state	87.9	79.8	79.5	80.0	71.7	65.9

**Note*. From *PTA program aggregate data* by, Commission for the Accreditation of Physical Therapy Education, 2020 (http://www.capteonline.org/uploadedFiles/CAPTEorg/About_CAPTE/Resources/Aggregate_Program_Data/AggregateProgramData_PTAPrograms.pdf)Statistical

Statistical assumptions were examined prior to analyzing data using binary logistic regression: the dependent variable, PTA program completion status, was dichotomous with the mutually exclusive values of completed or did not complete; the values of the program completion status were statistically independent of each other since students can only belong to one group, either completed or did not complete. A crosstabulation table was created to assess the relevance of the independent variables by examining the frequency of each data cell, which Warner (2013) maintains is a preferred call value of > 5. The proportion of students in the postbaccalaureate reverse transfer

group was expected to be approximately 34% of the sample, due to national PTA program data (CAPTE, 2020a). Considering the sample size of 548 students, the remaining two prior college enrollment statuses were expected to have enough members to satisfy the model with > 5 per cell. Table 9 shows the Prior College * Complete crosstabulation.

Table 9

*Prior College*Complete Crosstabulation*

Prior college	Complete		
	Did not complete	Completed	Total
First-time college	71	224	295
Some college no degree	37	99	136
Postbaccalaureate	14	103	117
Total	122	426	548

A crosstabulation table was also created for the covariate, ethnicity, to check for cell counts. The lowest ethnicity cell count was anticipated for American Indian/Alaskan Native due to the national PTA program proportion for this ethnicity below 1% according to CAPTE data (2020a) so there was a risk for this cell count to be < 5. See Table 10.

Table 10

*Ethnicity*Complete Crosstabulation*

Ethnicity	Complete		
	Did not complete	Completed	Total
American Indian/Alaska Native	1	0	1
Asian	1	4	5
African American	13	19	32
Hispanic/Latino	2	11	13
Native Hawaiian/Pacific Islander	1	0	1
Two or more races	1	3	4
Unknown	1	0	1
White	102	389	491
Total	122	426	548

Several ethnicity groups had cell counts < 5 so I combined these groups prior to data analysis. American Indian/Alaska Native, Asian, Native-Hawaiian/Pacific Islander, two or more races, and unknown were combined as *other* in a transformed variable named Ethnicity Groups. The combined ethnicity groups improved the cell counts for analysis, displayed in Table 11.

Table 11

*Ethnicity Groups*Complete Crosstabulation*

Ethnicity	Complete		
	Did not complete	Completed	Total
Other	5	7	12
African American	13	19	32
Hispanic/Latino	2	11	13
White	102	389	491
Total	122	426	548

Without controlling for prior college enrollment status, Hispanic/Latino students showed the highest completion rate of 84.6% but only accounted for 2.4% of the sample population. White students had a completion rate of 79.2% and comprised 89.6% of the sample. African American students had a completion rate of 59.4% and comprised 5.8% of the sample. The Other (combined ethnicity) group of students included American Indian/Alaska Native, Asian, Native Hawaiian/Other Pacific Islander, two or more races, and unknown race, comprised 2.2% of the sample, and had the lowest completion rate of 58.3% (see Table 11).

To compute the proportion of each ethnicity group by prior college enrollment status for comparison to known national data, a crosstabulation was created (see Table 12).

Table 12

*Ethnicity Groups*Prior College Crosstabulation*

		Prior College			
		First-time college	Some college no degree	Post-baccalaureate	Total
Ethnicity	Other	8	2	2	12
	African American	15	7	10	32
	Hispanic/Latino	10	2	1	13
	White	262	125	104	491
Total		295	136	117	548

The highest proportion of first-time students per ethnicity group was Hispanic/Latino, with 77% of the 13 students enrolled in college for the first time. The lowest proportion was African American students with 47% of the 32 students enrolled for the first time. The highest proportion of students with some college no degree was White, with 25% of the 491 students having earned credits in other academic programs prior to enrolling in the PTA program. Conversely, Hispanic/Latino students showed the lowest group proportion of some college no degree (15%). African American students had the highest group proportion of a prior bachelor's degree (31%), and Hispanic/Latino students had the lowest group proportion of a prior bachelor's degree (8%). When the minority groups are combined as one group, the proportion of the combined group who were first-time college students was 58% compared to 53% of White students. Likewise, 19% of the combined minority group were some college no degree compared to 25% of White students. Lastly, the proportion of the combined minority group that were postbaccalaureate was 23% compared to 21% of White students.

Binary Logistics Regression Model

Secondary data analysis was performed on student-level data using SPSS 27. A binary logistic regression model was created to answer the research question.

Research Question (RQ): To what extent is there a predictive relationship between a PTA student's prior college enrollment status of (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and PTA program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state?

Null Hypothesis ($H_{01)}$: There is no predictive relationship between a PTA student's prior college enrollment status of a) first-time college, b) some college no degree, or c) postbaccalaureate reverse transfer, and program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state.

Alternative Hypothesis ($H_{1)}$: There is a statistically significant predictive relationship between a PTA student's prior college enrollment status of (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state.

The program completion status was the dichotomous outcome variable and SPSS was set for *completed* to serve as the event of interest for comparative odds of program completion for three groups of students: (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer (see Table 13).

Table 13

Dependent Variable Coding

Original value	Internal value
Did not complete	0
Completed	1

The categorical predictor variable was the prior college enrollment status. The first-time college status served as the reference group to set up the ratio of odds and from which to compare the prior enrollment status of some college no degree and postbaccalaureate reverse transfer (see Table 14). The categorical covariate, ethnicity, was coded for four groups with the combination of the infrequently occurring ethnic minorities (see Table 15).

Table 14

Categorical Variable Codings

			Parameter coding	
		Frequency	(1)	(2)
Prior college	First-time College	295	.000	.000
	Some college no degree	136	1.000	.000
	Postbaccalaureate	117	.000	1.000

Table 15

Categorical Covariate Variables Coding

			Parameter coding		
		Frequency	(1)	(2)	(3)
Ethnicity	Other	12	1.000	.000	.000
	African American	32	.000	.000	.000
	Hispanic/Latino	13	.000	1.000	1.000
	White	491	.000	.000	.000

The first SPSS output was the Block 0 classification table (see Table 16). The classification table shows that the rate of PTA program completion in the null model for the full sample was 77.7% when the variables in the equation were not included. In other words, when prior college enrollment status and ethnicity were not considered, students had a 77.7% chance of completing the PTA program. The odds ratio of the null model is the value of Exp(B) and was 3.492, meaning that students are about 3.5 times more likely to complete a PTA program than to not complete when prior college enrollment status and ethnicity are not considered (see Table 17). The final SPSS output of the null model (see Table 18) suggests that the predictor variable groups of first-time college and postbaccalaureate reverse transfer, and the covariate of ethnicity will likely contribute statistical significances to the model, rejecting the null hypothesis, with the alpha level of this study set at $p < 0.05$.

Table 16

Block 0 Classification Table

			Predicted		
			Complete		
			Did not complete	Completed	Percentage correct
Step 0	Complete	Did not complete	0	122	.0
		Completed	0	426	100.0
	Overall percentage				77.7

Table 17

Block 0 Variables in the Equation

	B	*S.E.*	*Wald*	*df*	Sig.	Exp(B)
Step 0 Constant	1.250	.103	148.286	1	.000	3.492

Table 18

Block 0 Variables Not in the Equation

			Score	*df*	Sig.
Step 0	Variables	First-time college	9.643	2	.008
		Some college no degree	2.554	1	.110
		Postbaccalaureate	9.114	1	.003
		Ethnicity	7.132	1	.008
	Overall statistics		17.166	3	.001

In the Block 1 output, the goodness of fit was assessed with the omnibus tests of model coefficients that tests for a significant improvement in the model fit with the addition of the variables, as compared to the null model. The omnibus tests (see Table 19) meet the significance level of $p < .05$. The model summary (see Table 20) of the Cox & Snell R^2 and the Nagelkerke $R^{2,}$ uses a pseudo R^2 to give an approximated value of how much the variation in the model is accounted for from the addition of the variables. Nagelkerke R^2 is a scaled version of Cox & Snell with a maximum of 1 instead of .75 for ease of interpretation (Warner, 2013). The Nagelkerke R^2 provides moderate insight into the variance that is explained by the variables in the model, and the value of .048 suggests a small 4.8% variation, or effect size, in the model from the null model related to the variables.

Table 19

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	17.555	3	.001
	Block	17.555	3	.001
	Model	17.555	3	.001

Table 20

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	563.559	.032	.048

An additional analysis of the model fit is the Hosmer and Lemeshow Test and contingency table. The Hosmer and Lemeshow tests for nonfit of the model, so the desired significance is $p > .05$. The value of .996 (see table 21) confirms the model's goodness of fit. The contingency table (see Table 22) displays how the predicted group membership corresponded to the actual group membership, and the classification table shows the percentage of correctly classified cases for each group and the full sample (see Table 23).

Table 21

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.061	3	.996

Table 22

Contingency Table for Hosmer and Lemeshow Test

		Complete = Did not complete		Complete = Completed		
		Observed	Expected	Observed	Expected	Total
Step 1	1	18	18.154	28	27.846	46
	2	32	32.205	93	92.795	125
	3	59	58.165	203	203.835	262
	4	2	2.256	9	8.744	11
	5	11	11.219	93	92.781	104

Table 23

Classification Table

			Predicted		
			Complete		
	Observed		Did not complete	Completed	% Correct
Step 1	Complete	Did not complete	1	121	.8
		Completed	1	425	99.8
	Overall percentage				77.7

The final SPSS output is the full model with the categorical predictor variable of prior college enrollment status and the covariate, ethnicity (see Table 24). All variables were entered on step 1. First-time college was the referenced independent variable in the model to answer the research question, to what extent is there a predictive relationship between a PTA student's prior college enrollment status of (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, and PTA program completion, while controlling for ethnicity, at three PTA programs in a Midwestern state. The categorical predictor variable was coded as 0 = first-time college, 1 = some college no degree, and 2 = postbaccalaureate reverse transfer.

Table 24

Step 1 Variable in the Equation

							95% CI for Exp(B)	
	B	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*	lower	upper
First-time college			9.667	2	.008			
Some college no degree	-.196	.238	.667	1	.411	.822	.516	1.311
Post-baccalaureate	.859	.318	7.299	1	.007	2.360	1.266	4.399
Ethnicity	.154	.057	7.374	1	.007	1.167	1.044	1.304
Constant	.020	.433	.002	1	.963	1.020		

Note. CI=confidence interval. Lower = lower limit. Upper = upper limit

First-time college students and postbaccalaureate students have statistically significant coefficients in the model. The unstandardized Beta weight for the Constant; *B* = (.020), *SE* = .433, *Wald* = .002, $p > .05$. The unstandardized Beta weight for the prior college enrollment status of postbaccalaureate reverse transfer; *B* = (.859), *SE* = .318, *Wald* = 7.299, $p < .05$. The odds ratio displayed as *Exp(B)* shows a value of 2.360 for postbaccalaureate students, 95% CI (1.266, 4.399). This is interpreted as students with a prior bachelor's degree are 2.36 times as likely to complete a PTA program than first-time college students when controlling for ethnicity. Inversely, first-time college students are .42 times as likely to complete a PTA program as compared to postbaccalaureate students when controlling for ethnicity.

The covariate of ethnicity was coded for White as the reference, which had the highest coded value. The coding was 1 = Other, 3 = African American, 4 = Hispanic/Latino, and 8 = White. The *Exp (B)* or odds ratio for ethnicity is 1.167, 95% CI (1.044, 1.304), *SE* = .057, *Wald* = 7.374, $p < .05$, indicating that PTA program completion was 1.167 times more likely for students who are White, when compared to Hispanic/Latino, African American, or the Other combined group of ethnicities, when controlling for prior college enrollment status. Since Hispanic/Latino students were coded the highest of the remaining ethnicity groups to White, the inverse of the odds ratio (1/1.167) can be interpreted as, Hispanic/Latino students are 0.77 times as likely as White students to complete the PTA program when controlling for prior college enrollment status.

The negative value of B = - (.196) for the students with some college no degree indicates that earning prior college credits but not completing a degree decreases the likelihood of membership in the target group. However, the coefficient for the group with some college no degree did not meet the statistical significance threshold, since $p > .05$ and the null hypothesis was not rejected for this group. No differentiation was made in the data collection for the number of prior college credits earned. The number of prior college credits earned by the students with some college no degree could range from 1 – 120 and the wide range may partially explain this variable's lack of predictability related to PTA program completion.

Summary

Binary logistic regression was used to analyze deidentified student-level data at three PTA programs in a Midwestern state to investigate if prior college enrollment status of (a) first-time college, (b) some college no degree, or (c) postbaccalaureate reverse transfer, predicts PTA program completion, while controlling for ethnicity. The predictor and outcome variables were tested a priori to verify there were no violations of the assumptions. Some ethnicity groups were combined to improve cell counts to > 5. The Hosmer-Lemeshow goodness of fit was not significant ($p > .05$) indicating that the model was correctly specified. The -2 log Likelihood = 563.559 and the Nagelkerke $R^2 = .048$. Controlling for ethnicity, the model resulted in the independent variable attributes of first-time college and postbaccalaureate reverse transfer as significant ($p < .05$) in predicting PTA program completion, however some college no degree was not significant ($p > .05$). Ethnicity was significant ($p < .05$) in contributing to the model. The null

hypothesis is rejected for the predictor variable attributes of first-time college and postbaccalaureate reverse transfer, and the covariate of ethnicity. The alternative hypothesis is rejected for the predictor variable attribute of some college no degree.

In Chapter 4, I presented the results of the binary logistic regression analysis for PTA program completion for first-time college, some college no degree, and postbaccalaureate students, while controlling for ethnicity. In Chapter 5, I present the interpretation of the findings within the context of Astin's (1991) I-E-O college effect model, the limitations of the study, recommendations for further research, and implications for positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this causal comparative study was to determine if students' prior college enrollment status predicts physical therapist assistant (PTA) program completion, while controlling for ethnicity. The prior college enrollment status of (a) first-time college, (b) some college no degree, and (c) postbaccalaureate reverse transfer was the independent variable and ethnicity was the covariate. The dependent variable was the dichotomous PTA program completion status. Since an increasing number of students are transferring from 4-year institutions to 2-year PTA programs, the enrollment results of these students are needed for effective program planning. Prior evidence suggests that reverse transfer students may have lower completion rates than first-time college students. A quantitative study using binary logistic regression was performed with a sample of deidentified student level data from three PTA programs in a Midwestern state to answer the research question and contribute to the knowledge about PTA program completion. The key finding is that the prior college enrollment status of first-time college and postbaccalaureate reverse transfer are predictive of PTA program completion, with the highest completion rate by White students.

In Chapter 5, I describe the interpretations of the findings of the study in the context of Astin's I-E-O college effect model that provided the theoretical framework for the study. I discuss the study limitations and a compare the results with prior research. I also provide recommendations for further research, and I describe the implications for positive social change.

Interpretation of the Findings

The results of this study indicated that a PTA student's prior college enrollment status of first-time college or postbaccalaureate reverse transfer are predictive of PTA program completion when controlling for ethnicity. White students are most likely to complete a PTA program when controlling for prior college enrollment status and African American students are least likely to complete a PTA program. The low completion rates of minority students are consistent with the findings of Juszkiewicz (2020) who reported that, despite focused initiatives to improve degree completion amongst minority students, the national completion rates at 2-year institutions were just 29% for African American students, compared to 49% for White students, and 36% for Hispanic/Latino students (Causey et al., 2020b).

Without controlling for ethnicity, the group of PTA students who had some college no degree showed the lowest completion rate of the three groups. These findings confirm the results of Shapiro et al. (2019), who found that students who return to college with some college no degree complete their degrees at a lower rate than first-time college students. However, the results of this study disconfirm the conclusion of Haas and Hadjar (2020) that minority students are much more likely than White students to reverse transfer from a 4-year to a 2-year institution without earning a degree first. The sample data in this study showed that the proportion of the combined minority group who were some college no degree was 19% compared to 25% of White students.

The sample student level data from three PTA programs in a Midwestern state were compared to the population of all U.S. PTA students. Variances in the sample

compared to the population included: (a) a lower proportion of postbaccalaureate reverse transfer students enrolled in the sample institutions, (b) an excessively high number of first-time college students enrolled in the university setting compared to the community colleges, and (c) a lower proportion of minority students in the sample data. The variances in the sample compared to all U.S. PTA students prompt several considerations.

First, the sample had a lower proportion than the national average of postbaccalaureate reverse transfer students. Nationally, the proportion of postbaccalaureate reverse transfer students enrolling into PTA programs has shown an upward trend each year since 2014 and the proportion reached over 34% in 2019 (Commission for the Accreditation of Physical Therapy Education [CAPTE], 2020a). The sample showed an average enrollment proportion of 21% postbaccalaureate students from 2014 to 2019, with the lowest proportion in 2019, at only 11%. One explanation of this variance is that the sample represents PTA programs in a Midwestern state with a high density of PTA programs. The high number of nearby PTA programs increases access for students and may contribute to more first-time college students meeting selection requirements, resulting in a lower proportion of postbaccalaureate students (refer to Table 5). A second explanation for this variance is the presence of a unique PTA program in the Midwestern region that enrolls students who hold a bachelor's degree in athletic training for an accelerated PTA curriculum that awards the PTA degree in 15 months. The athletic trainer-to-PTA bridge program may have drawn students away from the area's traditional

PTA programs since these postbaccalaureate students can save time and money in their pursuit of a career in physical therapy.

The second variance in the sample population was the high number of first-time college students enrolled in School 2 (a university), despite the 2-year degree being the only option for earning a PTA credential (see Table 7). High school graduates are often directed to attend a university rather than a community college (National Association for College Admission Counseling, 2021) so a university-based PTA program may be very appealing to these students. But policymakers and community college leaders want high school students to have better information about the choices they have for postsecondary education, and many community college stakeholders assert that a stigma is associated with community college versus university enrollment (Robinson, 2022). The notion that the bachelor's degree is the preferred first degree for high school graduates has been discussed in literature as a contributor to high dropout rates and student debt accrual since many students are not academically prepared for the rigors of a university curriculum (Freismuth, 2017; Nix et al., 2021). Leaders in community colleges are advocating to advance the role of the 2-year institution as the noteworthy first step for students toward their baccalaureate goals, by enrolling in a community college for its transfer function (White, 2022).

The variance in the proportions of minority students who enrolled in the sample schools compared to all U.S. PTA programs reflects the less-ethnically diverse demographics of the Midwestern region, with 75% of the Midwest population being White, 10% African American, and 8% Hispanic/Latino. (U.S. Census Bureau, 2019).

Although the proportion of enrollment by minority groups was considerably low in the sample, the demographics of the Midwestern states are reflective of the national demographics of PTA graduates in 2019, with 71% White, 6% African American, and 13% Hispanic/Latino (CAPTE, 2020a). This variance in minority enrollment in Midwestern PTA programs underlines the need for initiatives by leaders in PTA education to increase diversity, equity, and inclusion in the region's PTA programs.

Astin's Input-Environment-Outcome College Effect Model

Astin's (1991) Input-Environment-Outcome (I-E-O) college effect model provided the theoretical framework for the study. The assessment model provides leaders in higher education the lens from which to view outcomes at the student, program, and institutional levels. By conducting this study and examining the independent variable of prior college enrollment status for any predictive relationship to the dependent variable of PTA program completion status, I contributed to the assessment process in PTA education regarding the interplay of input, environment, and outcome factors.

Standards under which all PTA programs are administered have been developed by CAPTE, the sole accrediting body of PTA programs. PTA programs are required to submit annual program data and meet strict outcomes benchmarks such as completion rates, licensure exam pass rates, and job placement. An extensive and comprehensive accreditation review and determination is performed every 10 years. The only degree level that is permitted for entry-level PTAs is the associate degree. For these reasons, PTA programs are similar in curriculum design, only differing in moderate ways based on differences in institutional missions and by state policies. Yet PTA program outcomes

vary widely amongst the nearly 400 PTA programs nationwide (CAPTE, 2020a). But the variations in outcomes cannot be explained solely by program characteristics such as curriculum model, faculty profiles, and clinical education experiences. PTA program directors must evaluate factors other than program features in the assessment of student outcomes, and Astin's I-E-O model guides the assessment process.

Astin's I-E-O model accounts for the influence of prior educational experiences, skills, and aptitudes as part of the overall assessment of the effectiveness of the educational program under examination. The educational program is the intervention or the environment of the model. But Astin emphasized that not all the students' knowledge or skills that are demonstrated at the conclusion of an educational program can be attributed solely to the intervention. Rather, students bring their own pre-existing input to the program. In other words, the student's educational experiences prior to enrolling in a new academic program are significant to the outcomes at the institution in addition to the intervention or environment of the program. Therefore, Astin supported the use of pretests and posttests to better analyze the impact of the educational program in between.

In PTA education, students commonly enroll with prior college education credits and over 34% already earned a bachelor's degree. It is important for leaders in PTA education to understand the impact that various student inputs have on PTA program outcomes. By conducting this study, I analyzed three different student inputs, related to the students' prior college enrollment status of (a) first-time college; (b) some college no degree; and (c) postbaccalaureate reverse transfer, to the outcome of PTA program completion. I also examined the input of ethnicity as a covariate. The results of this study

confirmed that student inputs have a predictive relationship to the outcome of PTA program completion. For this reason, programmatic assessment must not only focus on internal, environmental components of the educational program. The considerations of student inputs must also be examined.

Limitations of the Study

This study limitations are related to generalizability based on the sample size and the population being from one geographical region in the United States. The sample size of 548 students was approximately 20% of the Midwestern state's PTA students and less than 1% of the overall U.S. PTA student population from 2014 to 2019. The deidentified student level data from three PTA programs in a Midwestern state showed a less ethnically diverse composition of PTA students than the national aggregate data of all U.S. PTA students. Although the scantly represented ethnic groups were combined into one group and a statistically significant relationship was found between the independent and dependent variables, the effect size was small.

Another limitation of the study was not differentiating the number of prior college credits earned by students who were in the group, some college no degree. The wide range of credits earned by reverse transfer students could range from three to 120. The impact that prior college credits have on PTA program completion could be more directly studied with an additional continuous variable in the model, but accurately recording the number of credits would require additional student level education statistics since students do not self-report all prior college credits. Another caveat for the students who

have an unfinished degree is the time spent away from college before enrolling in a PTA program.

Recommendations for Further Research

The vision for PTA education is currently under much investigation by stakeholders, both in clinical practice and in academia. The evolving complexity of patient care in a rapidly changing healthcare system necessitates higher levels of critical thinking and decision making by PTAs than was the case even a decade ago. The role and required education of PTAs has remained steady for 50 years, but leaders in the physical therapy profession are considering significant changes to the education requirements of PTAs that would most likely include an entry-level bachelor's degree option.

Towards this end, the PTA Education Summit commenced in 2021 as the action step following the 2020 report of an appointed task force that looked at current issues in both the practice and the education of PTAs. The summit was a three-phase program that included: (a) a series of surveys to PTA students, clinical physical therapists (PTs) and PTAs, and PT and PTA educators; (b) three asynchronous educational modules for stakeholders to gain common knowledge about the current state of PTA education including regulatory constraints, followed by the engagement of stakeholder input in a fourth module; and (c) the drafting of a consensus-driven vision to inform the development of a strategic plan for the future of the profession's utilization and education of PTAs (APTA, 2022).

In addition to the valuable data collected from the recent summit events, Jewell et al. (2022) investigated the perceptions of PT and PTA clinicians on the current practice

and education needs of PTAs. The majority of PTs (*N*=813) responded that PTAs lack competency in several areas of practice that were related to the current education model. Of the 813 PT respondents, less than 4% reported that their career started as a PTA, suggesting that there are obstacles for PTAs to achieve the higher-level career as a doctor of physical therapy (DPT) after earning the PTA credential. The findings highlight the need for further research to determine the outcomes of the high percentage of PTA students who enroll in a PTA program after already earning a bachelor's degree since few are moving on to a DPT program.

In the United States there are only two accredited PTA-to-DPT bridge programs, located in Ohio and Texas, that are designed for PTAs to build on their current physical therapy practice knowledge to complete a DPT program (CAPTE, 2021a). PTAs who desire to enroll in a bridge program must also hold a bachelor's degree in a science-based major such as exercise physiology or kinesiology. All other DPT programs are graduate-level curriculum that include the foundational patient care skills that are included in a PTA curriculum. More information is needed to understand the education trajectory of PTAs, such as the college enrollment experiences prior to enrolling in a PTA program to better align PTAs to pursue stackable credentials toward a DPT without excessive educational debt from wasted credits or degrees.

In 2019, there were 374 PTA programs in the United States and 11% of the PTA programs were housed in baccalaureate colleges or universities (CAPTE, 2020a). Further research regarding the enrollment patterns of PTA students in these institutions may assist in understanding how students' prior college enrollment status impacts the

students' choice of a PTA program. If the educational leaders in the physical therapy profession move toward a bachelor's degree credential for PTAs, then this research will aid in the planning for the PTA programs in the next decade. Further investigation into the decisions by PTAs to enroll in additional education could add to the 2020 comprehensive study by the APTA on the impact of student debt on PTs and PTAs (APTA, 2020).

Implications for Positive Social Change

The results of this study are important for positive social change because PTA program directors and leaders in physical therapy education must understand the relationship between PTA students' prior college enrollment status, ethnicity, and PTA program completion. Understanding the relationship of students' prior college enrollment status on PTA program completion, while controlling for ethnicity, extends limited research on other known pre-admission student inputs which predict PTA program completion such as prerequisite GPA and pre-admission reading level (Easley, 2016; Kabiri et al., 2017).

High levels of postbaccalaureate student debt may reduce the student's likelihood of pursuing a graduate degree (Folch & Mazzone, 2021). For PTAs who intended to pursue a DPT degree, the added debt burdens of the associate PTA degree after earning a bachelor's degree may contribute to changes in career plans that could result in lower lifetime earning potential. An even greater negative financial consequence could result for postbaccalaureate students who enroll in a PTA program but do not complete the

credential since there is an accrual of additional student debt load without an increase in earning potential that would have been realized with a PTA credential.

Positive social change is achieved with better informed stakeholders addressing students' needs in three ways: (a) providing supportive services aimed at improving PTA program completion and ensuring the workforce supply of health care workers, (b) reviewing admissions policies to promote the selection of students who are most likely to achieve PTA program completion; and (c) prioritization of recruitment strategies to draw students to PTA programs at the most expedient point in the college enrollment trajectory while increasing minority enrollment.

Conclusion

PTAs are an important member of the health care team. They assist individuals in restoring physical function and improving quality of life. The education of over 12,000 PTA students per year contributes to maintaining a robust health care workforce. Leaders in PTA education need to understand the factors that influence whether PTA students complete the program and earn a credential.

One of the most notable characteristics of PTA students is the high number of prior college credits that students have earned prior to enrolling in a PTA program. It is becoming more common for PTA students to have already earned a bachelor's degree before enrolling in the 2-year PTA program. Despite the postbaccalaureate students' prior academic success, the pressures of student debt load, work, and family obligations may interfere with successful program completion.

This study examined whether a PTA student's prior college enrollment status predicts PTA program completion. The results of this study provide PTA program directors with a glimpse into how the prior college experiences that PTA students have (or do not have) can impact completion. The results of this study should be considered by college leaders when admissions policies are considered and may prompt the inclusion of more input factors such as prior degrees to increase a student's likelihood of PTA program acceptance. However, the increased number of postbaccalaureate reverse transfer students that enroll in PTA programs needs to be analyzed in the context of the mission of community colleges to provide access to underrepresented minority groups. The disproportionately low number of minority students who graduate from PTA programs and enter the physical therapy workforce reflects the need for leaders in PTA education to continue efforts to develop effective supportive resources for students to succeed. With improved student outcomes, the wide variety of PTA students, from first-time college to postbaccalaureate, will continue to build up a diverse health care workforce.

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