

Summer 2021

An Exploration of the Relationship Between Graduate Admission Criteria and Academic/Clinical Student Outcomes for Speech- Language Pathology Graduate Students

Jill Kumke

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AN EXPLORATION OF THE RELATIONSHIP BETWEEN GRADUATE
ADMISSION CRITERIA AND ACADEMIC/CLINICAL STUDENT OUTCOMES
FOR SPEECH-LANGUAGE PATHOLOGY GRADUATE STUDENTS

By

Jill Kumke

A DISSERTATION

Presented to the Faculty of

The Graduate College at the University of Nebraska Omaha

In Partial Fulfillment of Requirements

For the Degree of Doctor of Education

Major: Educational Administration

Under the Supervision of Dr. Tami Williams & Dr. Elliott Ostler

Omaha, Nebraska

July 9, 2021

Supervisory Committee:

Kay Keiser, Ed.D

Mitzi Ritzman, Ph.D.

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University of Nebraska, 2021

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The charge for speech-language pathology graduate admission committees is to identify candidates who will be successful academically and clinically in graduate school, all the while ensuring career readiness. This retrospective study focused on graduate admission criteria and students' academic and clinical outcomes, for eighty students that completed the program between 2016-2020. Statistical analysis was used to determine if relationships existed between traditional admission criteria and students' academic and

clinical outcomes. In addition, further analysis was completed to determine if these findings varied by student characteristics including, gender, race/ethnicity, tradition/nontraditional students, undergraduate degree, and undergraduate institution.

This study found the objective admission variables, i.e. undergraduate GPA and GRE scores significant correlated with academic outcomes. Specifically, undergraduate GPA (uGPA) correlated to graduate GPA (gGPA) and the GRE scores correlated to Praxis speech-language score. No correlation was found between objective admission criteria and student academic nor clinical outcomes. However, student characteristics did impact students' academic and clinical outcomes.

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Chapter 1: Introduction to the Problem

Speech-language pathology requires a master's degree as entry into the profession. In the 2018-2019 academic year, there were 281 accredited graduate programs in speech-language pathology in the United States. In those graduate programs, there were a total of 60,784 applicants, while only 21,007 applicants received offers of admission (Council of Academic Programs in Communication Sciences and Disorders (CAPCSD) & the American Speech-Language Hearing Association (ASHA), 2020). Graduate admission committees are presented with the challenging task of reviewing a large number of highly qualified applicants, with limited variability, for a relatively small number of openings (Forrest & Naremore, 1998; Halberstam & Redstone, 2005, Tekieli Koay et al., 2016).

Historically, speech-language pathology graduate programs have relied heavily on objective variables such as undergraduate grade point averages (uGPA) and the Graduate Record Examination (GRE) to predict student success in graduate education (Baggs et al., 2015; Forrest & Naremore, 1998; Fuse, 2018; Halberstam & Redstone 2005; Tekieli Koay et al., 2016). The charge for graduate programs is to identify candidates who will be successful academically and clinically in graduate school, all the while ensuring career readiness. The purpose of this study is to determine what admission variables (undergraduate GPA, GRE, letters of recommendation, and personal statement) are positively correlated with clinical and academic student outcomes. Outcome measures include academic outcomes such as graduate Grade Point Average (gGPA) along with passing the national certification exam (Praxis Speech-Language); and clinical outcome

measures include the cumulative clinical evaluation and student self-reported perception of preparedness to practice.

The role of speech-language pathology graduate programs is to identify, educate, and graduate career-ready speech-language pathologists. Speech-language pathology graduate programs are accredited through the Council on Academic Accreditation (CAA) for Speech-Language Pathology. The CAA has established standards that each accredited program must meet, which includes outcome data in three areas: on-time completion, passing rate for the Praxis speech-language exam and employment within one year of graduation. The outcome data, for the most recent three years, must be publicly available on each graduate program's website per CAA-accreditation guidelines (Council on Academic Accreditation, 2017).

The need for cultural and linguistically diverse (CLD) speech-language pathologists continues to grow, as the U.S. population continues to become more diverse. ASHA reported current membership lacks diversity; currently, 8.2% of members are of a racial minority compared to 27.6% of the U.S. population (U.S. Census, 2019). The American Speech-Language-Hearing Association's 2021 Strategic Objectives #6 is to "increase diversity/equity/inclusion (DEI) within the Association and the discipline" (ASHA, 2021b). Data from 2018-2019 indicated speech-language pathology graduates enrolled in their first year were mostly white females (80%) with only 20% of students identifying as racial/ethnic minority; 4% were male (CAPCSD & ASHA, 2020).

Graduate admission is the first step in the rigorous process of becoming a licensed and ASHA-certified speech-language pathologist. Graduate program admission committees have historically and overwhelmingly focused on objective measures,

specifically undergraduate GPA and GRE scores, which are easily quantifiable (Forrest & Naremore, 1998; Fuse, 2018; Halberstam & Redstone 2005; Saenz, 2000). However, these measures may not provide adequate information to determine potential competency in both academic and clinical outcomes for students. A holistic approach to graduate admission may provide graduate programs with more comprehensive understanding of applicants as they strive to graduate candidates who are well-rounded (academically and clinically) and prepared to meet the demands of a dynamic workforce. In addition, this overreliance on objective admission criteria (undergraduate GPA and GRE scores) may negatively impact the recruitment of diverse applicants (Fuse, 2018; Saenz, 2000). The GRE is often an additional expense with well-documented inherent biases (Attiyeh & Attiyeh, 1997; Posselt, 2016). Cahn (2015) reported that health professions whose admission criteria included optional GRE requirements attracted students who might otherwise not apply. However, this factor alone did not impact minority enrollment into graduate programs (Cahn, 2015).

Fuse (2018) further explored barriers for underrepresented students in communication sciences and disorders. The socioeconomic status (SES) of the student had an impact on the student's undergraduate GPA (uGPA). Findings indicated uGPA is often lower for students that fall within a lower SES as they balance working, family and academics. Furthermore, there was a relationship between students' uGPA and family member level of education attainment. Student from lower SES backgrounds overwhelmingly lacked the presence of a college-educated role model (Fuse, 2018).

Researchers have begun to explore the effectiveness of the speech-language pathology graduate admission process to look for possible relations between graduate

admission and student's clinical and academic outcomes. The majority of the studies completed in health care professions focus on the use of objective admission criteria to predict academic and clinical outcomes (Baggs, et. al., 2015; Mahowald et al., 2017; Reed, 2017). Other studies have focused on subjective measures such as interviews, personal statement and letters of recommendation with mixed results (Halberstam & Redstone, 2005; Mahowald, et. al, 2017). In addition, a few studies have looked at the use of personality tests to predict student academic and clinical outcomes, with mixed results (Roitsch, et. al., 2020; McLarnon, et.al., 2017). This study will seek to determine the relation between objective and subjective admission variables and students' clinical and academic outcomes, as well as if this varies by student characteristics (traditional/non traditional graduate student, racial/ethnic diversity, gender, undergraduate degree, along with undergraduate institution).

Conceptual Framework: I-E-O Model

The framework utilized in this study is Astin's (1991; 2012) Input-Environment-Outcome (I-E-O) Conceptual Model for Assessment. The premise of this framework is that educational outcomes are not independent, but rather a result of individual characteristics (Input) that are influenced by experiences within the educational environment (Astin, 2012). This framework has been utilized in previous studies looking at speech-language pathology graduate admission (Kjelgaard & Guarina, 2012; Moore, 2013; Roitsch, 2018). The I-E-O theoretical framework proposes that student outcomes are influenced by both student inputs and environmental factors (Astin,1991; 2012).

For this study, the Input (I) includes independent variables for admission into the speech-language pathology graduate program consisted of the following factors: undergraduate GPA, GRE scores (analytical writing, verbal reasoning, and quantitative reasoning), personal statement, and letter of recommendation. In addition, this study will look at how student characteristics (traditional/non- traditional graduate student, racial/ethnic diversity, gender, undergraduate degree, along with undergraduate institution) may impact the admission process.

Astin (1991; 2012) defines the environment as everything that occurs throughout the program that may affect the students' outcomes. The factors included in Environment (E) for this study include academic and profession standards for speech-language pathology, set forth by the Council of Academic Accreditation (CAA) and the Council for Clinical Certification (CFCC). Although there is variance in environments between programs, the standards are consistent across programs. Another factor is cohort size. The size of cohorts varies across programs and may impact the outcome variables. The cohort size for this study was considered a mid-size program, with approximately twenty students per cohort.

Outcomes (O) are the dependent variables. The student attributes (Input) along with the program environment culminates in outcome for each graduate student. The outcome data points for this study include: graduate GPA, national certification examination (Praxis), cumulative clinical assessment, self-reported preparedness to practice along with on-time completion of the program.

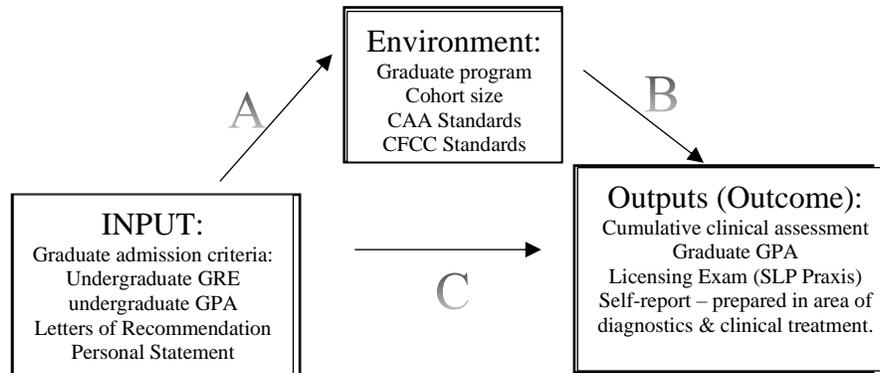


Figure 1. Astin's I-E-O Conceptual Model for Assessment and Study Variables

Purpose Statement

The purpose of this retrospective quantitative study is to extend research regarding the relation between common speech-language pathology graduate admission criteria and academic and clinical outcomes. Specifically, this research investigates the relation between (a) objective and subjective admission criteria, as well as (b) academic and clinical outcomes.

Research Questions

1. What is the relationship between speech-language pathology graduate admission criteria and students' academic and clinical outcomes?
2. What impact do the individual student characteristics such as race/ethnicity, gender, undergraduate degree, undergraduate institution attended, traditional/nontraditional graduate student, have on graduate admission criteria and student academic and clinical outcomes?

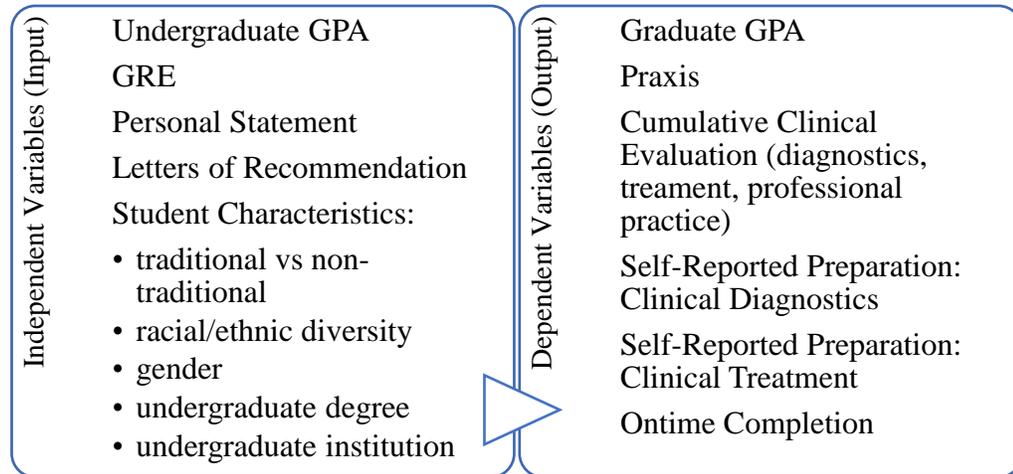


Figure 2: Independent and Dependent Variables

Operational Definitions

Traditional graduate student

A traditional graduate student is a person who entered college immediately following high school, completed undergraduate degree in 3-5 years and then enrolled in a speech-language pathology graduate program (typical age is 21-25).

Non-traditional graduate student

A non-traditional graduate student is an adult over the age of 25, who is pursuing a graduate degree part-time while working full-time, or one who returns after a significant break or interruption following the completion of an undergraduate degree (Gonclaves et. al., 2014; Center for Law and Social Policy [CLASP], 2015).

Undergraduate Grade Point Average (uGPA)

Undergraduate grade point average (uGPA) provides interval data ranging from 0.00 to 4.0. It is based on completed academic coursework at the undergraduate level.

Graduate Grade Point Average (gGPA)

graduate grade point average (gGPA) is interval data ranging from 0.00 to 4.0. It is based on completed academic coursework at the graduate level.

Graduate Record Exam (GRE)

The GRE is a standardized assessment. It is often used as part of the graduate admission process. Three categories are assessed: Analytical Writing: Provides interval data between 0.00-6.00 in half-point increments; Verbal Reasoning: Provides interval data between 130 -170, in 1-point increments, and Quantitative Reasoning: Provides interval data between 130-170, in 1-point increments.

Letters of Recommendation

Letter of recommendation is a document written by a person, typically a professor or employer, who can speak to the applicant skills.

Personal Statement of Purpose

Personal statement or application essay is written by the applicant as part of the application process.

Cumulative Clinical Evaluation

Cumulative clinical evaluation is a summative assessment of the graduate student's performance in the areas of (1) diagnostics skills, (2) treatment skills and (3) professional practice, interaction, and personal qualities.

Praxis Exam in Speech-Language Pathology

The Praxis in speech-language exam is a standardized computer-driven assessment that assess foundational knowledge, knowledge of professional practice and specialized knowledge across nine diagnostic categories for assessment and intervention (Education Testing Services [ETS], 2015). This test is scored using interval data between 100 and 200 with one-point increments. A student must earn a minimum score of 162 to pass the Praxis to qualify for ASHA credentialing and licensing in many states.

Self-Assessment (self-reported preparedness for employment)

Self-assessment is “the evaluation or judgement of the worth of one's performance and the identification of one's strengths and weaknesses with a view to improving one's learning outcomes” (Klenowski, 1995, p. 146).

On-Time Completion

As part of the CAA accreditation process, speech-language pathology graduate programs must publicly report how many semesters are required to complete their graduate program. This is available via the graduate program's website in addition to ASHA EdFind. The Council on academic accreditation (CAA) required programs to publicly

report the number of students that completed their graduate program within the program's published timeframe. Eighty percent of the students must successfully complete the program in the published time frame to meet one of the CAA outcome standards (CAA, 2020).

Gender

Students self-select gender (for this study, male/female) as part of the application process.

Race & Ethnicity

Students self-select race and ethnicity as part of the application process. Ethnicity is a grouping of humans based on shared attribute with a common set of traditions. Race is a grouping of humans of physical or social qualities.

Significance of Study

This study will contribute to the body of literature and practices around graduate admission criteria and students' academic and clinical outcomes. The findings of this study will be of interest to university graduate admission committees, specifically in the field of speech-language pathology. Currently, limited research exists that looks at admission criteria and students' academic and clinical outcome within the field of speech-language pathology. This study will focus on traditional admission criteria (objective and subjective) and students' academic and clinical outcomes, while looking at the potential impact that individual student characteristics may have on admission criteria along with student's academic and clinical outcomes.

Contribution to Practice

This study may be of particular interest to university graduate admission committees, by providing further insights into how admission criteria, both subjective and objective, correlate with student's academic and clinical outcomes. In addition, the findings will look beyond the cohort level and determine if variance exists based on individual student characteristics, such as race/ethnicity, gender, tradition/non traditional student, undergraduate degree and undergraduate institution. This information is critical as graduate programs look to recruit and retain diverse graduate students into the field of speech-language pathology.

Contribution to the Research

This study will contribute to the current research regarding the relation between graduate admission criteria and student academic and clinical outcomes. Furthermore, the study may provide additional information regarding the impact of student characteristics on admission criteria and student's academic and clinical outcomes. The finding from this study, may facilitate changes to admission criteria in an effort to recruit and retain a diverse cohort of speech-language pathology graduate students.

Delimitations

This study focuses on a single midwestern metropolitan speech-language pathology graduate program with an average cohort size of twenty. Even with similarities across graduate programs, it is possible the results may not generalize across programs.

Outline of the Study

This retrospective quantitative study will explore the relation between speech-language pathology graduate students' admission data and student outcome data. Specifically, this study will review program data from students who entered the graduate program in 2014-2018 and completed the program in 2016-2020. Chapter one introduces the problem, describes the conceptual framework, illustrates the significance of the study, purpose, and the research questions. Chapter two provides a review of the literature around graduate admission and program outcomes. Chapter three will outline the quantitative research design, participants, along with methodology. Chapter four will describe the results of the study, including data analysis and interpretation of findings. Chapter five will provide a summary, analysis of the findings, and recommendation for further study and future research.

Chapter 2: Literature Review

The purpose of this retrospective quantitative data study is to explore speech-language pathology graduate admission criteria relation to student's academic and clinical outcomes, for a midwestern metropolitan speech-language pathology graduate program. The framework for this study is Astin's (1991; 2012) Input-Environment and Outcome (I-E-O) Conceptual Model for Assessment. The literature review is organized utilizing the framework. This chapter begins with historical information about the profession followed by exploration of admission criteria; undergraduate grade point average (uGPA), Graduate Record Examination (GRE), letters of recommendation, personal statements, along with a brief look into the student perspective of the admission process. The next section is centered around the environment aspect of the I-E-O framework. This section focuses on the accreditation and licensure standards that must be met by the program, as set forth by the Council of Academic Accreditation (CAA) and the Council for Clinical Certification (CFCC). The outcome (O) section explores students' academic and clinical outcome measures including graduate Grade Point Average (gGPA), Praxis speech-language exam, cumulative clinical evaluation, and student perception of being prepared to practice in the field. In conclusion will explore the possible influence of student characteristics, (racial/ethnic diversity, gender, undergraduate degree) on admission criteria and outcome measures.

Brief Overview of Profession

Communication disorders impact five to ten percent (15 to 30 million) people in the United States (Ruben, 2009). The expertise of a speech-language pathologist is advantageous to address communication impairments. Speech-language pathologists work with all ages, from infants to adults to treat various communication and swallowing disorders. According to ASHA, speech-language pathologists treat a variety of communication disorders across the “big nine” areas of communication disorders, which includes articulation; fluency; voice and resonance; receptive and expressive language; the cognitive aspect of communication; social aspects of communication (pragmatics); communication modalities (oral, manual, and augmentative and alternative, assistive technologies); swallowing; and hearing (ASHA, n.d.).

Speech-language pathology is a relatively new field of study. In 1965, the Certificate of Clinical Competence (CCC) was established, and a master’s degree or equivalent was required to practice in this field. Sixty semester hours (24 in major area), 274 clinical practicum hours, followed by nine months of supervised full-time employment and passing of the National Examination in Speech Pathology (NESPA) (ASHA, nd). As recent as 1993, certification changed to require a master’s degree in speech-language pathology, equivalency no longer accepted (ASHA, nd). In 2020, a minimum of 36 graduate semester hours, in addition to courses in biological sciences, chemistry or physics, statistics and social/behavioral sciences required. Graduate student must obtain a minimum of 400 ASHA clinical clock hours, pass the Praxis speech-language examination, and complete a 36-week full-time clinical fellowship year following completion of a master’s degree (ASHA, nd).

Speech-language pathology is a desirable career path. The U.S. News and World Report (2020) ranks speech-language pathology as the sixth (6th) best healthcare job and number eight (#8) on 100 Best Jobs. In addition, speech-language pathology is a growing profession. According to the Bureau of Labor Statistics (2019), the field is set to grow by 27% from 2018-2028. To become a certified speech-language pathologist, one must complete a master's degree (from a CAA-accredited institution), pass the Praxis II: speech-language pathology exam, and complete a 36-week clinical fellowship.

Graduate Admission Criteria

The demand for master's degree programs will continue to rise as a conduit of entry level career expectations, financial stability, and increasing diversity of the workforce (Okahana et al, 2018; Torpey & Torrell, 2015). Graduate admission decisions, unlike undergraduate admission are mostly decentralized and the decisions are made by a small department or a selected committee within a specific department (Kent et al, 2016; Orfield, 2014). Regardless of the discipline of study, historically, graduate programs overwhelmingly request two common items: transcripts (undergraduate GPA) and standardized test scores, most often from the GRE (Forrest & Naremore, 1998; Hackman et al., 1970; Halberstam & Redstone, 2005; Weber et al., 1942). Programs may “weigh” undergraduate GPA and GRE scores as part of their admission process; however, there is a lack of empirical research evidence to support this practice (Forrest & Naremore, 1998). A 2019 study of graduate admission found that the most common requested admission materials consisted of transcripts (undergraduate GPA), standard test scores (GRE), letters of recommendations, and a personal statement (Michel et al., 2019). The

charge of the speech-language pathology graduate admission committees is to identify applicants with the best potential to successfully complete the graduate program and become competent clinicians to serve diverse clientele (Ryan et al, 1998; Tekieli Koay et al., 2016). Some graduate programs have made conscious efforts to increase the diversity of graduate students and have begun to rethink graduate admissions, moving towards a more holistic admission processes (Glazer et al, 2014; Kent & McCarthy, 2016; Mandulak, 2021; Okahana et al., 2018).

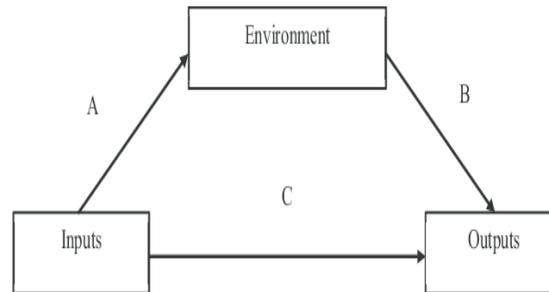


Figure 3: Astin's I-E-O Conceptual Model for Assessment, (Astin, 2012, p. 20)

Input, Admission Criteria

Objective Admission Criteria

Historically, speech-language pathology graduate admission committees have relied heavily on objective variables, undergraduate GPA and GRE Scores. (Baggs et al., 2015; Forrest & Naremore, 1998; Halberstam & Redstone, 2005; Richardson et al., 2020). A recent three-year study using the centralized application service (CSDCAS) for speech-language pathology graduate programs indicated that undergraduate GPA and GRE were the strongest predictors of admission decisions (Theodore et al., 2019).

Undergraduate Grade Point Average (uGPA). Grade Point Averages are difficult to compare between programs of study, from university to university. The idea of grade inflation is well-documented (Cluskey et al., 1997; Grove & Wasserman, 2004; Jewell & McPherson, 2012; Klafter, 2019). This is not a new phenomenon, rather originates back to 1960, during anti-Vietnam War movement (Klafter, 2019). During the 1940-1950's, prior to Vietnam era, when C was the most common grade, more students earned grades of D and F than A and B. (Rojstaczer & Healy, 2012). This is in stark contrast to current university grading practices today. By the late 2000's, a study completed by Rojstaczer and Healy (2012), found that 73% of public and 86% of private universities grades were A's and B's; furthermore, D's and F's comprised less than 10% of all letter grades. The variance between grading systems from university to university makes it difficult for graduate admission committees to ensure they are comparing academic performance equally across applicants. Rojstaczer and Healy (2012), found private universities often have higher percentages of A's (4.0) than public universities. This is further complicated by graduate applicants having only a slight variation in their undergraduate GPAs between applicants. That variation may have more to do with where a student attended their undergraduate education rather than their effort/knowledge.

Okahana and colleagues (2018) reported that over 99% of graduate program require transcripts and use them to evaluate past academic performance. In addition, 84% of professionally focused master's program directors reported successful completion of undergraduate coursework as a very important aspect of the admission process.

Guiberson and Vigil (2020) study found that 85% of speech-language pathology graduate programs participating in the study (110 speech-language pathology graduate programs

participated) used a minimum grade point average as part of the screening process and 73% reported that undergraduate GPA was the most important aspect of screening decisions.

Some studies within the field of speech-language pathology claim there is a correlation between undergraduate GPA and graduate success (Halberstam & Redstone, 2005; Kuncel et al., 2001; Forrest & Naremore, 1998; Rhodes et al., 1994). Forrest and Naremore (1998) found that undergraduate GPA could determine graduate success with 93.3% accuracy. Halberstam and Redstone (2005) found a strong link between undergraduate GPA in communication disorders coursework and graduate GPA and faculty rating of student clinical performance (high/low). In addition, they found a significant correlation between overall undergraduate GPA and graduate GPA, however this relation was academic only, no clinical application was found (Halberstam & Redstone, 2005). According to ASHA EdFind (2019) there is variability between what speech-language pathology graduate programs consider for undergraduate GPA as part of the admission process. The speech-language pathology graduate programs mostly vary between using a total undergraduate GPA or utilizing undergraduate GPA from communication disorders courses. Graduate programs that look at undergraduate GPA in communication sciences and disorders, typically includes approximately thirty hours of required coursework including ASHA required science courses (Ryan et al., 1998).

The correlation between undergraduate GPA and clinical performance appears less linear. Limited studies have looked at the relation between undergraduate GPA and clinical skills. Clinical skills are defined differently in the studies, including the use of clinical grades, clinical educator/faculty ratings of the student's clinical skills or use of

the Praxis Speech-Language score (Baggs, et. al., 2014; Kjelgaard & Guarina, 2012; Halberstam & Redstone, 2005). Reisfeld and Kaplan (2020) completed a systematic literature review look at predicting clinical success in Graduate Health Science fields, including speech-language pathology, and determined that there is not a clear outcome measure for clinical skills and therefore the lineage of admission criteria to student's clinical outcomes are unclear.

Graduate Record Examination (GRE). The Graduate Record Examination (GRE) General Test is a common graduate admission criterion. The GRE, as of 2011, is set up to reflect graduate school thinking, and is divided into three subtests, Verbal Reasoning, Quantitative Reasoning and Analytical Writing (ETS, 2021). The premise is that the GRE provides a look into the applicant's higher level thinking skills that are needed to be successful in a graduate program. The GRE is standardized and has historically been viewed as the hallmark for graduate admission.

A recent study of graduate program directors found that graduate admission committees use the GRE scores to look at cognitive skills such as analytical and critical thinking. In addition, some programs use it to look at academic rigor of past academic performance (Okahana et al., 2018). Okahana and colleagues (2018) found that the writing section of the GRE is often considered as a stand-alone criterion for many graduate programs. Some academic programs indicated that a high GRE writing score could overcome/replace a low overall GRE score or low undergraduate GPA (Okahana et al., 2018).

Historically, the GRE tends to have been an opaque predictor of graduate success with variable predictive value (Moneta-Koehler et al., 2017; Morrison & Morrison, 1995, Ryan et al, 1998). A study in counseling education reported that GRE scores were useful in predicting success of candidate's academic success, i.e. graduate GPA and passing of professional boards (CPCE) (Hatchett et al., 2017). In contrast, Forest and Naremore (1998) found limited use of GRE scores in predicting graduate student success academically or clinically in speech-language pathology. However, Baggs and colleagues (2014) looked at cognitive admission criteria: GRE, undergraduate GPA, and ASHA-required undergraduate science courses GPA, and the correlation to outcome on the Praxis speech-language exam. This study of 230 students found that students with a higher GRE-Total (GRE-T) and GRE-Quantitative (GRE-Q) were indicative of a low need supervision rating, indicating they were stronger clinically (Baggs et al., 2014). In addition, the GRE-T scores are useful in predicting Praxis speech-language exam passing rate. Kjelgaard and Guarino (2012) found that students with a higher GRE-Quantitative (GRE-Q) score upon admission continued to outperform other students in high demanding courses as measured by graduate GPA.

The GRE is one of the most scrutinized aspects of graduate admission criteria (Michel et al., 2019). ETS has established six guidelines for graduate programs using GRE scores. The ETS guidelines include (using multiple sources of information, consider the three GRE subtests as separate and independent measures, interpret GRE scores with the understanding that it is not an exact measure, use of percentiles to compare students needs to ensure the correct ranks are utilized, only compare scores on the same subtest) (ETS, 2018). In addition, ETS endorses the use of multiple sources of

information in the admission process, recommending a holistic approach to graduate admission process and warns against using cut scores (ETS, 2018).

Diversity, GRE/undergraduate GPA. ETS acknowledges that student from diverse backgrounds (economic, racial and ethnic) perform differently on standards assessments (ETS, n.d.). A graduate admission study, focused on increasing diversity of students at Vanderbilt's biomedical program found that predictive trends between GRE scores (which were not part of the acceptance criteria, but were collected and scores ranged from first to the 91st percentile) and GRE long-term graduate outcomes were non-existent (Sealy, et. al., 2019). However, this study did find that undergraduate GPA did correlate with degree completion. Through the use of linear regression analysis this study found that no admission criteria were predictive of passing national boards (Sealy, et. al., 2019) Another study completed at the University of Washington Graduate School of Nursing found that numerous barriers, such as, financial, time constraints, outdated GRE scores, feeling of incompetence in math skills, presented by using the GRE scores far outweighed the 5% to 8% predictive benefit of utilizing the GRE scores (Katz et al., 2009).

Researchers have documented that there are inherent biases associated with the GRE as related to diversity (Attiyeh & Attiyeh, 1997; Posselt, 2016; Wilson et al., 2019). Educational Testing Services (ETS) acknowledges that some bias is possible with the GRE and recommends that the GRE is used as a part of a holistic admission process to ensure program of fit and value added to the program (ETS, nd).

Relying heavily on GPA and GRE as admission criteria may serve as a hindrance to having a diverse graduate cohort. Fuse (2018) reported that undergraduate GPA is often lower for students who identify as racial/ethnic minorities and who are classified as lower SES. These students are often balancing working and academics as they need to pay for daily expenses and tuition. In addition, students from diverse background often are first generation college students and do not have a family role model with a college degree unlike their higher SES counterparts. Another notable hurdle to applying for graduate school comes from the expense of the registration fee to complete the GRE, along with college application fees are often cost prohibitive for low SES, cultural and linguistic diverse undergraduate students (Attiyeh & Attiyeh, 1997; Fuse, 2018; Posselt, 2016). ETS states that there is incongruity in performance among underrepresented groups (women, and ethnic/racial minorities) on the GRE. (ETS, n.d.; ETS, 2020; Kent et al., 2016).

Undergraduate Degree and Non-Traditional Student. Kjelgaard and Guarino (2012) found that, while students with an undergraduate degree in communication disorders often had a higher undergraduate GPA than students with entering with an undergraduate degree from a field outside of communication sciences and disorders (CSD). However, students with an undergraduate degree outside of CSD often entered the graduate program with higher GRE scores and performed better on the Praxis speech-language exam at the conclusion of the graduate program (Kjelgaard & Guarino, 2012).

Forrest and Naremore (1998) also found that students with an undergraduate degree in disciplines outside of communication disorders were more likely to be

successful in a speech-language pathology graduate program. The author noted that this finding may be more complex, as students who enter with an undergraduate degree from a different discipline tend to be older and have previous work experience prior to entering graduate school (Forrest & Naremore, 1998).

Subjective Admission Criteria

Letters of Recommendation. There is limited research around the predictability of letters of recommendation and graduate student outcomes. Letters of recommendation continue to be a part of the admission criteria for graduate programs across disciplines (Halberstam & Redstone, 2005; Kuncel et. al, 2014; Michel et. al., 2019; Okahana et al, 2018). Proponents for the use of letters of recommendation as a part of the graduate admission process report that letters of recommendation may provide a glimpse into the candidates “soft skills” (Kuncel et al., 2014; Kuncel et al, 2001; Michel et.al, 2019). Soft skills are often defined as interpersonal/pragmatic (social) skills that are key to collaborating and communicating with others (Dixon, et.al., 2010).

Letters of recommendation are typically rated by more than one faculty member as part of the graduate application process. Dirschl and Adams (2000) explored interobserver reliability in evaluating letters of recommendation for orthopedics training program. They found that interobserver demonstrated significant variability in the interpretation of letters of recommendation.

Limited variability in recommendation letters adds to the complexity of their utilization in the admission process. Aamodt and Williams (2005) evaluated

recommendation letters in a dichotomous fashion looking at recommendation letters written by professors and employment supervisors. Their study found limited discrepancy in rating the quality of the applicant, but some variance related to personality traits. Researchers have noted that inflation and an overwhelming positive halo effect occurs with letters of recommendations (Aamodt & Williams, 2005; Sedlacek, 2004; Sedlacek & Prieto, 1990). Leising and colleagues (2010) found that applicants are more likely to ask for recommendation from instructors that know the applicant well and like them. Thus, adding to the inflation or halo effect that occurs with letters of recommendation. In addition, the reader of letter of recommendation may inflate rating based on the relationship with the writer of the letter of recommendation especially when the reader knows the writer or the writer is from a prestigious institution or organization (Nicklin & Roch, 2009). In fact, Sternberg (2010) reported that universities would benefit from having the applicant submit evidence of noncognitive skills (soft skills) rather than attempt to use letters of recommendation as part of the graduate admission process.

A number of biases in letters of recommendation may impact their utility and emphasize the need for letter reading training (Nicklin & Roch, 2008; Nicklin & Roch, 2009). To curb biases some graduate programs in health fields have moved to the use of standardized letter of recommendation (Walters et al, 2006). Research has also show that the gender of the writer influences the linguistic content of the letter (Dutt et. al., 2016; Turrentine et. al., 2019).

Another concern around letters of recommendation is litigation. Law suites may be brought forth by the applicant, typically around defamation of character. However, within the university setting one must be aware of the implications of federal statutes

prohibiting discrimination. Specifically, the Family Education Rights and Privacy Act (FERPA) 20 U.S. Code § 1232g. The faculty member must have written approval from the student to provide a written or oral recommendation to a third party. This authorization by the student must be retained by the faculty member for at least three years. FERPA also required the letter of recommendation clearly state that the recipient is not permitted to share with other entities without the student's permission (Toglio, 2007). Diab and colleagues (2011) study looked at the difference in letter of recommendation between applicants that waived their FERPA rights to see the letter and those that did not. This study completed at a single university did not find a difference in ratings by the recommender whether the student had the right to see the letter of recommendation or not.

A few studies within the field of speech-language pathology have looked at letters of recommendation as a predictor of graduate success. Halberstam & Redstone (2005) completed a correlation study looking at how admission material, including letters of recommendation, correlated to academic outcomes along with positive clinical ratings. Findings indicated that letters of recommendation were effective in predicting how students would perform academically in graduate school. Kuncel and colleagues (2014) studied recommendation letters and graduate outcomes such as graduate GPA by running a meta-analysis resulting in a modest correlation. This study suggested that programs develop a systemic structure around recommendation letters to assure they are assessing the right constructs, specifically around motivation and persistence (Kuncel et. al., 2014).

Personal Statements. Okahana and colleagues (2018) reported that personal statements were used by graduate program to assess cognitive and non-cognitive characteristics. This study found that 54% of participating graduate programs require personal statements as part of the graduate admission process. The most common use (89%) was to assess applicants' written communication skills. Over 70% of program directors reported using personal statements to assess non-cognitive skills such as curiosity and creativity. Murphy and colleagues (2009) found that personal statements are not effective in predicting academic success when contrasted with undergraduate GPA and GRE scores. The power in personal statements is around non-cognitive skills and ensuring "program fit" (Murphy et al., 2009). Sedlack (2004) found the unless raters are trained and reliable on scoring student essays they are an unreliable indicators of applicants success.

Personal statements are a common requirement across speech-language pathology graduate programs (ASHA EdFind, 2019). Halberstam and Redstone (2005) explored predictive value of speech-language pathology graduate admission materials looking at objective and subjective measures. Their research indicated that personal statements did predict graduate GPA (.013 significance) but did not predict clinical performance. This study found that personal statements can be a helpful part of the admission review for speech-language pathology.

Student Perspective of Admission Process

How students and faculty view the admission process varies (Chari & Potvin, 2019; Steffani & Slavin, 1997; Sylvan et al, 2020). This juxtaposition of the admission

process, between the student applying and the faculty members reviewing, provides another opportunity for analysis. There is limited and variable information published regarding the admission review process in speech-language pathology (Steffani & Slavin, 1997; Tekieli Koay et. al, 2016). The information published on graduate programs' websites varies greatly (Tekieli Koay et. al., 2016). Sylvin and colleagues (2020) surveyed speech-language pathology graduate students and found that students reported a variety of challenges in the application process. These challenges included time/cost, pressure of competition, and lack of information about the process. Armond (2016) reported that students believed the areas of application that are most important for graduate admission include: undergraduate GPA, letters of recommendation and writing samples. Sylvin and colleagues (2020) reported that graduate applicants would prefer programs to focus less on the GRE or make it optional. This survey found that the cost of the graduate application process can be a financial burden and, in some cases, prohibited the student from applying to all the schools they were considering. Amrod (2016) reported that students applying for graduate admission in speech-language pathology typically apply to an average of six (6) graduate programs (range of 1-14).

Students with higher undergraduate GPA (higher than 3.75) had a higher acceptance rate across programs (Amrod, 2016). Students reported basing their decision to accept admission on the following factors: Program reputation, cost (in state vs. out of state tuition), and geographic location (Armond, 2016).

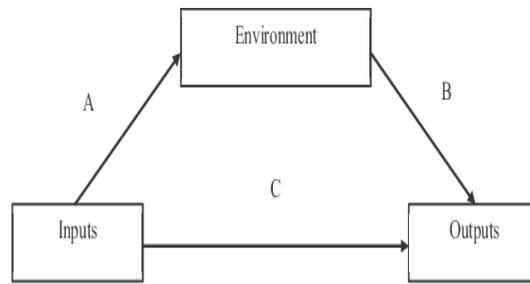


Figure 4: Astin's I-E-O Conceptual Model for Assessment, (Astin, 2012, p. 20)

Environment, Accreditation Standards

Astin (2012) defined the environment as everything that occurs throughout the program that may affect the students' outcomes. The environment of the program is important to understand how admission criteria (input) can influence outcome criteria. Astin's Input-Environment-Outcome (I-E-O) model serves as the conceptual framework for this study. The similar set of standards across graduate programs allows for a similarity of graduate environments to exist from program to program.

Speech-language pathology graduate programs are accredited through the Council on Academic Accreditation (CAA) and have a clear set of standards to meet set forth by the CAA and the Council for Clinical Certification in Audiology and Speech-Language Pathology (CFCC). "The CAA serves the public by promoting excellence in the graduate education of audiologists and speech-language pathologists. Through a peer review process, the CAA establishes accreditation standards and facilitates continuous quality improvement of the programs it accredits. Graduates of CAA-accredited and candidate programs are educated in a core set of skills and knowledge required for entry into independent professional practice. The CAA is committed to quality and dedicated to audiology and speech-language pathology programs' success in preparing future professionals" (CAA, n.d).

In 1980, ASHA established the Professional Standards which were implemented by three semi-autonomous boards included the Educational Standards Board which was responsible for monitoring and establishing standards for graduate programs. In 1993, a joint committee was formed to study educational programs and establish accreditation principles. In 1996, the Educational Standards Board was replaced by the Council on Academic Accreditation in Audiology and Speech-language Pathology (CAA), an autonomous organization. “The CAA is charged with establishing, defining, monitoring, and implementing accreditation of graduate education programs. ‘Graduate’ refers to post-baccalaureate programs leading to a master's or doctoral degree, whether offered through graduate or professional schools” (American Speech-Language-Hearing Association, 2021, p. 3). In 2020, 288 speech-language pathology graduate programs were accredited by the CAA.

The Council for Higher Education (CHEA) and the United States Secretary of Education recognizes the CAA as the accrediting body of professional educational program in speech-language pathology and audiology in the United States (Council of Academic Accreditation, 2020). The Council of Academic Accreditation Standards (2020b) address six essential components. The components are:

- Standard 1.0: Administrative structure and governance
- Standard 2.0: Faculty
- Standard 3.0B: Curriculum (academic and clinical education) for speech-language pathology programs
- Standard 4.0 Students
- Standard 5.0 Assessment

- Standard 6:0 Program resources

The Council for Clinical Certification in Audiology and Speech-Language Pathology (CFCC) is a semi-autonomous body that defines the standards for clinical certification in addition to other priorities. These priorities include granting certification, withdrawing certification, and maintenance of certification (Council for Clinical Certification in Audiology and Speech-Language Pathology (CFCC), 2018). The CFCC Standards (2020) include:

Standard I: Degree (applicants must have a master's degree)

Standard II: Education Program (All academic and clinical coursework must be completed at a CAA accredited program)

Standard III: Program of Study

Standard IV: Knowledge Outcomes

Standard V: Skill Outcomes

Standard VI: Assessment (Passing the national Praxis Exam)

Standard VII: Speech-Language Pathology Clinical Fellowship

Standard VIII: Maintenance of Certification

The CAA and CFCC standards are vital to establishing a well-rounded graduate program. The CAA standards focus on the overall graduate program while the CFCC standards are specific to student level outcomes, as well as course and clinical offerings. This solid foundational building blocks of all graduate programs allows for a similarity in environment across programs.

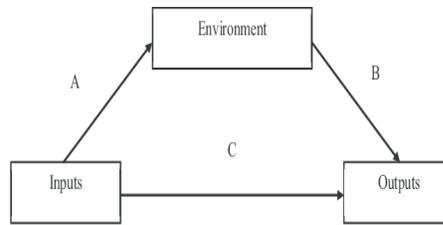


Figure 5: Astin's I-E-O Conceptual Model for Assessment, (Astin, 2012, p. 20)

Outputs, Student Academic and Clinical Outcomes

Academic Outcomes

Graduate Grade Point Average. Graduate Grade Point Average (gGPA) is used as an outcome marker for graduate success and is most often measured on a 4.0 scale. Often there are standards in graduate school to maintain a gGPA of at least a 3.0 to continue in the program of study. Students' overall performance in the program is often measured by their final graduate GPA (Forest & Naremore, 1998; Halberstam & Redstone, 2005; Roitsch et. al., 2020).

Speech-Language Pathology Praxis. The Praxis Speech-Language Pathology test is designed for students to demonstrate their knowledge of speech-language pathology content and consists of three sections: Foundation, Implementation and Evaluation of Treatment (ETS, n.d.). The passing score for ASHA certification is 162 (on a 100-200 scale) (ASHA, n.d.). The Praxis speech-language pathology exam is often used to indicate student success in graduate school (Baggs et. al., 2014; Forest & Naremore, 1998; Kjelgaard & Guarino, 2012; Moore, 2013).

Clinical Outcomes

Cumulative Clinical Evaluation. Speech-language pathology is a robust clinical program. Clinical education allows students to integrate academic knowledge and apply to clinical practice, under the supervision of a certified speech-language pathologist who is trained as a clinical education. The cumulative evaluation may serve as both formative and summative assessment data throughout the graduate clinical program. This process aligns with Council for Certification (CFCC) and Council on Academic Accreditation (CAA) Standards. Graduate students develop clinical competencies depth and breadth of experiences across the “Big Nine” and the lifespan (Anderson, 1988; Sheepway et al, 2014).

Kjelgaard and Guarino (2012) looked at graduate admission criteria and summative clinical evaluation of speech-language pathology students. The summative clinical evaluation used was a five-point scale, (1) poor to (5) superior. Ratings were completed by the program’s clinical practicum coordinator and included written and verbal assessment from site supervisors, observations, evaluation of the students’ level of independence, along with analysis of foundational skills related to clinical practice (e.g. critical thinking, flexibility). This study found that undergraduate GPA and GRE-Quantitative were predictive of clinical competence (Kjelgaard & Guarino, 2012).

Career Readiness

The National Association of Colleges and Employers (NACE) defines career readiness as “the attainment and demonstration of requisite competencies that broadly prepare college graduates for a successful transition into the workplace” (National Association of Colleges and Employers [NACE], 2021). NACE identifies the following skills as essential for college graduates to be career ready: critical thinking/problem solving; teamwork/collaboration; oral/written communication; leadership; work ethic/professionalism; career management; along with global/intercultural fluency (NACE, 2019). Okahana and colleagues (2018) completed a study investigating graduate program admissions. The results indicated 51% of program directors from professionally focused graduate programs rated the ‘potential to work/securing employment in the field’ as ‘very important.’ In contrast, this research showed that completion of the program was one of the biggest concerns to program directors (Okahana, H., et. al., 2018).

Snapshot of the Diversity of Speech-Language Pathology

Practicing speech-language pathologists are typically white (92%) and female (96%) (ASHA, 2020). This stark statistic is further highlighted with speech-language pathology being described as the 4th whitest job in America (Thompson, 2013). ASHA recognizes the need to increase diversity and has highlighted it as part of the ASHA Strategic Plan (2020) Objective #6: Increase the diversity of membership.

Holistic Admission

The American Medical Association (AMA) recognized and began to address the need for a culturally competent system of care in the early 2000's. This awareness is changing the face of medicine, along with graduate admission practices encouraging the move toward a holistic review process. The Association of American Medical Colleges (AAMC) defines holistic review as: "Holistic Review refers to mission-aligned admissions or selection processes that take into consideration applicants' experiences, attributes, and academic metrics as well as the value an applicant would contribute to learning, practice, and teaching. Holistic Review allows admissions committees to consider the "whole" applicant, rather than disproportionately focusing on any one factor" (Association of American Medical Colleges, 2020).

The majority of graduate programs (over 80%) in the medical field (medical school, dentistry, public health and pharmacy) have moved to a holistic admission process (Glazer et al., 2014). Guiberson and Vigil (2020) reported that 46% of speech-language pathology graduate admissions are using some holistic admission practices. These practices included interviews, following an initial screening, along with a closer look at non-cognitive attributes. Some programs indicated they require an essay question related to diversity. The programs that reported having moved to some aspects of holistic admission reported that diversity in their graduate cohort has increased. However, the high reliance on undergraduate GPA and GRE scores has seemingly remained unchanged (Guiberson & Vigil, 2020).

A recent study completed by Mandulak (2021) reviewed holistic admission and how it could be applied to speech-language pathology graduate programs. A holistic

admission would create a paradigm shift from looking for the best student (cognitive variable assessment) to looking for the best candidate for the program (program fit). Mandulak (2021) reported that there is evidence from health-related fields to support the shift in graduate admission process from traditional to holistic in communication sciences and disorders. Allowing Speech-Language Pathology programs the opportunity to use a wider lens in looking at graduate applicants. Thus, increasing diversity of the student population and eventually, the population of those that are practicing speech-language pathology.

The importance of non-cognitive attributes continues as part of the admission process continues to be of discussion for diversifying the student body of graduate programs. Sedleck (2017, p. 1) focuses on the following eight non-cognitive variables as essential components of the graduate admission committee review:

1. Positive self-concept
2. Realistic self-appraisal
3. Understands and knows how to navigate the system and racism
4. Prefers long-range goals to short-term or immediate needs
5. Availability of a strong support person
6. Successful leadership experience
7. Demonstrates community service
8. Knowledge acquired in or about field (nontraditional learning)

The use of race as part of the graduate admission process has been an on-going dilemma in the United States. There has been various legislation and executive orders around affirmative action, including the Civil Rights Act of 1964. The purpose of the legislation was focused on ensuring access to higher education (and employment) for

African Americans, Latinos, American Indians, and white women in fields where they were underrepresented. A variety of Supreme Court cases have looked at graduate admission and the role of race. Some of these cases include: *Regents of the University of California v Bakke* (1978), *Grutter v. Bollinger* (2003), *Gratz v. Bollinger* (2003), along with *Fisher v. University of Texas* (2013). In all of these cases, the Supreme Court cited that use of race in admission policies must be a part of the university's overarching vision/mission as demonstrated by investment and interest around the educational benefits of diversity (Graces, 2014).

The U.S. Supreme Court decisions support the holistic admission process. In *Grutter v. Bollinger* (2003) the University of Michigan Law school utilized a holistic admission process to promote a diverse student body. The Supreme Court ruled in favor of the University and set a precedent that universities can use race as a factor in admission without violating the Equal Protection Clause of the Fourteenth Amendment when utilized as part of the holistic admission process. The U.S. Supreme Court further upheld this with the *Fisher v. University of Texas* (2013) decision. Both cases allowed the universities to utilize race as a part of their holistic admission process.

Summary

Graduate admission committees tend to have a heavy focus on the applicant's ability to complete the graduate program (Okahana et. al., 2018). However, researchers continue to struggle or to agree on the best way to predict student success. This is further complicated by the need to not only ensure graduates are academically and clinically prepared but are culturally competent and career ready.

Chapter 3: Methods

This chapter includes a description of the methodology and outlines the process of data collection and analysis used for this retrospective quantitative study. This chapter describes the purpose of the study, research question, participants, measures, and data analysis.

To protect the participants involved in the study, access to the data was granted from departmental administration after data was de-identified and admission/outcome data was matched. In addition, the Institutional Review Board (IRB) and the Office of Regulatory Affairs (ORA) determined this study does not constitute human subject research as defined at 45CFR46.102 so no IRB approval was warranted.

Purpose

The purpose of this retrospective quantitative study was to extend research regarding speech-language pathology graduate admission predictors of clinical and academic success. Specifically, this research investigated if there is any relationship between (a) objective and subjective admission criteria, as well as (b) academic and clinical outcomes.

Research Questions

1. What is the relationship between speech-language pathology graduate admission criteria and students' academic and clinical outcomes?

2. What impact do the individual student characteristics such as race/ethnicity, gender, undergraduate degree, undergraduate institution attended, traditional/nontraditional graduate student, have on graduate admission criteria and students' academic and clinical outcomes?

Participants

Archived data was utilized from a Midwestern metropolitan university speech-language pathology graduate program. This retrospective quantitative study used de-identified student data collected as part of the application process along with program outcomes from fall 2014 entry to 2020 summer graduation.

Measures for Data Collection

Data from the following sources were examined for this study.

Admission Data

The following admission data is collected by the program, undergraduate GPA, GRE scores, two letters of recommendation and a statement of purpose. The Graduate candidates' undergraduate GPA was retrieved from their final undergraduate transcripts. The candidates' GRE scores were collected as part of the graduate admission process. The GRE is broken down into three categories: analytical writing; verbal reasoning; and quantitative reasoning. Two faculty members rated the students' statement of purpose, on a 0-4 point scale (with four being the highest quality), as part of the admission process. The faculty ratings are averaged. For this study, the ratings were put into two categories

by rating, high (3-4.0)/low (1-2.9). Two letters of recommendation were collected as part of the admission process for each candidate. The letters are reviewed by two faculty members and the scores are averaged. The scores range from 0–4-point scale, with four being the highest positive recommendation. For this study, the ratings were put into two categories, high (2.5-4)/low (1-2.4).

Student Characteristics

Student characteristics were collected during the admission process. The applicant could self-report or choose not to respond to a variety of demographic questions. The student characteristics used in this study include gender, race/ethnicity, undergraduate degree, undergraduate institution, and traditional/nontraditional student.

Program Outcome Data

Program outcome data included graduate GPA, Praxis speech-language score, cumulative clinical evaluation, self-reported prepared to practice. The data was collected from a variety of sources. Graduate GPA (gGPA) for each student was collected from the graduates' final transcript. The Praxis Speech-Language Pathology test scores were collected from the students' academic files (previously printed from the ETS website). Taking the Praxis Speech-Language Pathology test is a required component of the graduate program. The cumulative clinical evaluation is part of the program requirements. The cumulative clinical evaluation is located in the student's academic file upon completion of the program. There are three areas on the cumulative clinical evaluation: Evaluation Skills, Treatment Skills and Professional Practice, Interaction and

Personal Qualities. The rubric for Evaluation Skills and Treatment Skills is divided for a sub score in each of the “Big Nine” areas of communication disorders. The student is scored by their clinical educator during each clinical experience throughout their graduate program. The rating is on a 1-5 rubric, with five being the highest score. All students must meet minimal benchmarks (3.0) across all domains and items. This tool serves to ensure students possess clinical competency across the breadth and depth of speech-language pathology diagnostic categories as part of their master’s degree requirements. Students complete an exit survey upon completion of the graduate program. As part of this survey, students report if they feel prepared in the areas of diagnostics and intervention.

This correlation study is designed to determine if there is a relation between admission data and student academic and clinical outcomes. Graduate admission criteria included undergraduate GPA, GRE scores, personal statement, and letters of recommendations. Outcome data included graduate GPA, Praxis scores, cumulative clinical evaluation, self-reported preparedness for clinical practice (diagnostic and treatment).

Data

Table 1: Independent and Dependent Variables

| | |
|---|--|
| Independent Variable (Admission Criteria) | Undergraduate GPA (continuous variable) GRE- Verbal Reasoning (continuous variable) GRE- Quantitative Reasoning (continuous variable) GRE- Analytical Writing (continuous variable) Letter of Recommendation (dichotomous variable) Personal Statement (dichotomous variable) |
| Dependent Variables (Academic & Clinical Outcome Data) | Graduate GPA (Continuous variable) Praxis (Continuous variable) Cumulative Clinical Evaluation – Diagnostics Skills (Continuous variable) Cumulative Clinical Evaluation – Treatment Skills (Continuous variable) Cumulative Clinical Evaluation – Professional Practice, Interaction and Personal Qualities (Continuous variable) |

Data Analysis for Research Question 1

1. What is the relationship between speech-language pathology graduate admission criteria and students' academic and clinical outcomes?

Descriptive Statistics

Descriptive statistics were used to provide a picture of the data by classifying and summarizing. For each criterion, a minimum, maximum, and mean will be reported in chapter 4.

Table 2. Descriptive Statistics

| | Mean | Minimum | Maximum |
|------------------------------------|------|---------|---------|
| Undergraduate GPA | | | |
| GRE- Verbal Reasoning | | | |
| GRE- Quantitative Reasoning | | | |
| GRE – Analytical Writing | | | |
| Graduate GPA | | | |
| Praxis | | | |
| Summative Clinical diagnostic | | | |
| Summative Clinical treatment | | | |
| Summative Clinical Professionalism | | | |

Pearson Correlation Coefficient

To determine the outcomes of the research questions, a Pearson Correlation Coefficient was completed between each independent variable (undergraduate GPA, GRE) and each dependent variable (graduate GPA, Praxis, cumulative clinical evaluation). The Pearson Correlation Coefficient ranges from -1.0 to +1.0, where correlations close to 0 indicate a weak relationship, and not cause/effect. (Frey, 2016).

Table 3. *Pearson r Correlation*. Admission Criteria and Student Outcomes

| | gGPA | Praxis | Clinical dx | Clinical tx | Clinical prof |
|---------|------|--------|-------------|-------------|---------------|
| uGPA | | | | | |
| GRE – V | | | | | |
| GRE- Q | | | | | |
| GRE -W | | | | | |

Multiple Linear Regression

Multiple linear regression was used to further explore the relationship between admission criteria and student academic and clinical outcomes that a significant relationship was determined by completing Pearson correlation coefficient.

Point-Biserial Correlation

A point-biserial correlation was used to measure the strength and direction of the association that exists between one continuous variable and one dichotomous variable. Admission criteria (dichotomous) included personal statements and letter of recommendation correlated with student outcome data (graduate GPA, Praxis speech-language score, and cumulative clinical evaluation). Student outcome data (dichotomous) included (student self-perception of preparation in diagnostics and treatment) was correlated with admission criteria (undergraduate GPA, and GRE scores).

Table 4. Point Biserial Correlations between Subjective Admission Criteria and Student Outcomes

| | gGPA | Praxis | Clinical dx | Clinical tx | Clinical Prof |
|-------------------------------------|------|--------|-------------|-------------|---------------|
| Personal Statement (high/low) | | | | | |
| Letter of Recommendation (high/low) | | | | | |

Table 5. Point Biserial Correlation between Objective Admission Criteria and Student Outcomes

| | Student report prepared in dx | Student report prepared in tx |
|--------|-------------------------------|-------------------------------|
| uGPA | | |
| GRE-V | | |
| GRE- Q | | |
| GRE-W | | |

Research Question 2

2. What impact do individual student characteristics such as, race/ethnicity, gender, undergraduate degree, undergraduate institution attended, traditional/nontraditional graduate student, have on graduate admission criteria and student’s academic and clinical outcomes?

Table 6. Percentage of Student with Similar Characteristics

| | Male | Female | White | Racial/Ethnic Diverse | Traditional | Nontraditional |
|---------------|------|--------|-------|-----------------------|-------------|----------------|
| | (n=) | | (n=) | | (n=) | |
| % of students | | | | | | |

Table 7. Student Characteristics; Undergraduate Degree and University

| | This undergrad | Other Undergrad | CDIS bachelors | Other bachelors |
|---------------|----------------|-----------------|----------------|-----------------|
| | (n=) | | (n=) | |
| % of students | | | | |

Table 8. Student Characteristics (dichotomous variables)

Racial/ethnic diversity (white/other)

Gender (male/female)

Tradition/non-traditional student

Undergraduate degree (communication sciences and disorders/other)

Undergraduate institution (university study being completed at/another university)

Ontime completion

Point-Biserial Correlation

A point-biserial correlation was used to measure the strength and direction of the association that exists between one continuous variable and one dichotomous variable.

Student characteristics (dichotomous) included race/ethnicity, gender, traditional/nontraditional graduate student, undergraduate degree, undergraduate institution and on-time completion of graduate program was correlated with admission criteria (undergraduate GPA, and GRE scores), table x.

Point-biserial correlation was used to measure the strength and direction of association between student academic and clinical outcomes (continues variables) which include, undergraduate GPA, and GRE scores, and student characteristics (dichotomous variables) including, race/ethnicity, gender, traditional/nontraditional student, undergraduate degree, undergraduate institution along with on-time completion of the graduate program.

Table 9. Point Biserial Correlation between Demographic Factors and Graduate Admission Criteria

| | uGPA | GRE-V | GRE-Q | GRE-W |
|----------------------------|------|-------|-------|-------|
| Ethnicity | | | | |
| Gender | | | | |
| Traditional/nontraditional | | | | |
| Undergraduate degree | | | | |
| Undergraduate institution | | | | |
| Ontime completion | | | | |

Table 10. Point Biserial Correlation between Student Characteristics and Student Outcomes

| | gGPA | Praxis | Clinic dx | Clinic tx | Clinic Prof |
|----------------------------|------|--------|-----------|-----------|-------------|
| Ethnicity | | | | | |
| Gender | | | | | |
| Traditional/nontraditional | | | | | |
| Undergraduate degree | | | | | |
| Undergraduate institution | | | | | |
| Ontime Completion | | | | | |

Phi Correlation

A phi correlation is used to measure the strength of association between two dichotomous variables. This study will explore if student characteristics impact dichotomous admission criteria and student self-rating of their own clinical skills (diagnostic and treatment) at the completion of the program.

Table 11. Phi Correlation between Student Characteristics and Admission Criteria and Student Outcomes

| | Personal Statement | Letters of recommendation | SR Prepared dx | SR prepared tx |
|---------------------------|--------------------|---------------------------|----------------|----------------|
| Ethnicity | | | | |
| Gender | | | | |
| Tradition/nontraditional | | | | |
| Undergraduate Institution | | | | |
| Ontime Completion | | | | |

Summary

The purpose of this retrospective quantitative study was to extend research regarding speech-language pathology graduate admission predictors of clinical and academic success. Specifically, this research investigated if there is any relationship between (a) cognitive and non-cognitive admission criteria, as well as (b) academic and clinical outcomes.

Chapter 4: Analytics

The purpose of this retrospective quantitative study was to investigate the relationship between speech-language pathology graduate admission criteria and program academic and clinical outcomes. The interaction of the data and relationship among variables were analyzed.

Research Questions

1. What is the relationship between speech-language pathology graduate admission criteria and students' academic and clinical outcomes?
2. What impact do the individual student characteristics such as, race/ethnicity, gender, undergraduate degree, undergraduate institution attended, traditional/nontraditional graduate student, have on graduate admission criteria and student academic and clinical outcomes?

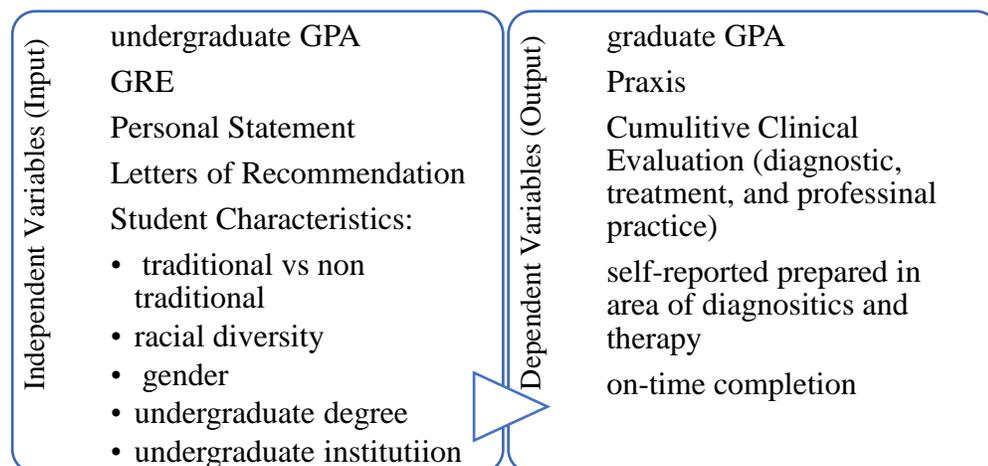


Figure 6: Independent and Dependent Variables

Participants

The sample consisted of eighty (80) students who entered and completed the speech-language pathology graduate program between Fall 2014- Summer 2020. The diversity of the student population was limited. Only eight percent (8%) identified as being of racial/ethnic diversity, and only one (1) male completed the program during this time. Fifty-four percent (54%) of the students completed their undergraduate degree and continued through the master program at this university. The rest of the cohorts comprised of students from eleven different states. Most of the students (94%) of the students were considered traditional students. The vast majority of students (96%) completed an undergraduate degree in Communication Sciences and Disorders.

Table 12. Student Characters: Gender, Race/Ethnicity, Tradition/Non-traditional

| | Male | Female | White | Racial/Ethnic Diverse | Traditional | Nontraditional |
|---------------|--------|--------|---------|--------------------------|-------------|----------------|
| | (n=80) | | (n= 79) | | (n = 80) | |
| % of students | 1% | 99% | 92% | 8% | 94% | 6% |

Table 13. Student Characteristics; Undergraduate Degree and University

| | This undergrad | Other Undergrad | CDIS bachelors | Other bachelors |
|---------------|----------------|-----------------|----------------|-----------------|
| | n= 80 | | n=80 | |
| % of students | 54% | 46% | 96% | 4% |

Data Analysis

Descriptive Statistics

The students in this study had an average undergraduate GPA (uGPA) of 3.7. That national average for uGPA admitted into a speech-language pathology graduate program during the 2019-2020 ranges from 3.3-4.12 (CAPCSD & ASHA, 2021). The average Praxis Speech-Language Pathology score for the students in this study was 175, which matches the 2018-2019 national average also a mean of 175 (ASHA, 2019).

Table 14. Descriptive Statistics

| (n=80) | Mean | Minimum | Maximum |
|--------------------------------|-------|---------|---------|
| Undergraduate GPA | 3.7 | 3.08 | 4.0 |
| GRE- Verbal Reasoning | 149.6 | 138 | 162 |
| GRE- Quantitative Reasoning | 146.9 | 137 | 155 |
| GRE – Analytical Writing | 3.86 | 2.5 | 5.5 |
| Graduate GPA | 3.84 | 3.3 | 4.0 |
| Praxis | 175 | 163 | 190 |
| Clinical Diagnostic Skills | 4.43 | 3.84 | 4.94 |
| Clinical Treatment Skills | 4.48 | 3.74 | 4.86 |
| Clinical Professional Practice | 4.53 | 4.14 | 4.79 |

Pearson Correlation

A Pearson correlation was run on parametric data to look for a linear relationship between admission criteria and graduate outcomes. The correlation coefficient can range from -1 to +1 with -1 indicating a perfect negative correlation, +1 indicating a perfect positive correlation, whereas 0 indicates no correlation. Table 15 illustrates the correlation between admission criteria and outcome data. The results indicated a four positive correlation exist between admission criteria and academic and clinical outcomes.

Table 15 illustrates person r correlation coefficients for admission criteria and student academic and clinical outcomes. There were four significant correlations found. Undergraduate Grade Point Average (uGPA) significantly correlated ($p < .05$) with graduate Grade Point Average (gGPA), ($r = .252$, $n = 80$, $p = .024$). Two sections of the Graduate Record Examination (GRE) significantly correlated ($p < .01$) to the Praxis speech-language exam. The GRE-Verbal Reasoning ($r = .418$, $n = 80$, $p = .000$) and the GRE-Analytical Writing ($r = .299$, $n = 80$, $p = .007$). In addition, significant correlation ($p < .05$) was found between GRE -Analytical Writing correlated with Cumulative Clinical Diagnostic Skills rating, ($r = .221$, $n=80$, $p=.049$).

Table 15. Pearson r Correlation Matrix for Admission Criteria and Student Outcomes

| | gGPA | Praxis | Clinical dx | Clinical tx | Clinical prof |
|---------|-------|--------|-------------|-------------|---------------|
| uGPA | .252* | .170 | -.050 | .079 | .130 |
| GRE – V | -.131 | .418** | .103 | .001 | .082 |
| GRE- Q | .131 | .186 | .169 | .059 | .162 |
| GRE -W | .183 | .299** | .221* | .176 | .162 |

*Correlation is significant at the .05 level

**Correlation is significant at the .01 level

Linear Regression

A multiple linear regression or linear regression was completed between variables with significant correlation identified through Pearson Correlation to further explore the relationship between these statistically significant variables.

Pearson correlation analysis revealed a relationship between undergraduate GPA (uGPA) and graduate GPA (gGPA). A liner regression was completed, and the results

indicate that undergraduate GPA was a predictor ($p < .05$) of graduate GPA ($\beta = .252$, $t = 2.303$, $p = .024$). The linear regression analysis determined that undergraduate GPA could predict graduate GPA with 5.2% accuracy.

Table 16. Linear Regression, Undergraduate and Graduate GPA

| | B | T | <i>p</i> |
|-------------------|------|-------|----------|
| Undergraduate GPA | .252 | 2.303 | .024 |

A multiple linear regression was completed to look at the relationship between admission criteria: GRE-Verbal Reasoning, GRE-Analytical Writing, and the Praxis speech-language score. A significant correlation was found between GRE-Verbal Reasoning of $p = .000$ and GRE -Analytical Writing at $p = .030$ ($p < .05$). The multiple linear regression analysis determined that GRE- Verbal Reasoning and the GRE – Analytical Writing can predict a student Praxis Speech-Language score with 20.3% accuracy.

Table 17. Multiple Linear Regression, GRE and Praxis Speech-Language

| | B | t | <i>p</i> |
|-------------|------|-------|----------|
| GRE- Verbal | .374 | 3.650 | .000 |
| GRE-Writing | .226 | 2.204 | .030 |

A multiple linear regression was completed to look at the relationship between GRE-Analytical Writing and Cumulative Clinical Diagnostic Skills. A correlation was found between GRE-Analytical Writing and Cumulative Clinical Diagnostic Skills with a

significance value of $p = .049$ ($p < .05$). The linear regression indicates that GRE-Analytical Writing can predict a student cumulative clinical diagnostic skill with 3.7% accuracy.

Table 18. Multiple Linear Regression, Clinical Diagnostic Skills

| | β | t | p |
|-------------|---------|-------|------|
| GRE-writing | .221 | 2.004 | .049 |

Point Biserial Correlation

Point Biserial Correlation was used to measure the strength and direction of association that may exist between a continuous variable and a dichotomous variable. Admission criteria of personal statements and letters of recommendation were grouped by high and low ratings. Personal statements were scored on a four-point scale by two raters and then averaged, high, rating of 3 or above ($n = 37$) and low, rating below 3 ($n = 42$). Letters of recommendation were rated using a four-point scale by two raters and then averaged for a final score, high, rating of 2.6 or above ($n = 29$) and low rating, 2.5 or below ($n = 41$). Table 19 illustrates the p values for point biserial correlations where the dichotomous variable for admission criteria compared to continuous variable for outcome measures (graduate GPA, Praxis speech-language score, clinical diagnostic skills, clinical treatment skills and clinical professional practice, interaction, and personal qualities). No significant correlations were found.

Table 19. Point Biserial Correlation for Admission Criteria and Student Outcomes.

| | gGPA | Praxis | Clinical dx | Clinical tx | Clinical Prof |
|-------------------------------------|------|--------|-------------|-------------|---------------|
| Personal Statement (high/low) | .200 | .111 | -.014 | -.023 | -.080 |
| Letter of Recommendation (high/low) | .158 | .090 | -.006 | .063 | .056 |

No significant correlations ($p < .05$) were found.

Three outcome variables were correlated to admission criteria using point biserial correlation to look for significant relationship. The dichotomous outcome variables consisted of on-time completion, student self-reported feeling prepared to practice (diagnostics and treatment). This was completed on a five-point Likert scale but for the analysis was broken down into two categories, rating of four or above (high) and three or below (low). No significant correlations were found between admission criteria and student self-rating of being prepared to practice.

Table 20. Point Biserial Correlation Admission Criteria and Student Outcomes.

| | Ontime completion (n=80) | Student report prepared in dx (n=57) | Student report prepared in tx (n=58) |
|--------|-----------------------------|---|---|
| uGPA | .016 | .094 | -.001 |
| GRE-V | -.060 | .010 | .001 |
| GRE- Q | -.133 | .187 | -.004 |
| GRE-W | -.098 | .037 | .150 |

No significant correlations ($p < .05$) were found.

Research Question 2

What impact do the individual student characteristics such as, race/ethnicity, gender, undergraduate degree, undergraduate institution attended, traditional/nontraditional graduate student, have on graduate admission criteria and student academic and clinical outcomes?

Student characteristics were divided into dichotomous groups to further explore if student characteristics impact admission criteria and/or student academic and clinical outcomes. Table 21 illustrates the number of students, who self-reported having similar characteristics.

Student Characteristics

Table 21. Student Characteristics by Number of Students with Similar Characteristics.

| Race/ethnicity | White (n = 71) | Nonwhite (n = 6) |
|--|--|---|
| | | Mexican, Hawaiian, Latino, African American, 2 or more Races, Asian |
| Gender | Male (n = 1) | Female (n= 79) |
| Student | Traditional (n= 75) | Nontraditional (n = 5) |
| Undergraduate Institution | Completed at same institution as graduate (n=39) | Completed at another institution (n=41) |
| On-time completion of graduate program | On-time (n= 78) | Longer than anticipated (n=2) |

Point Biserial Correlation

A Point Biserial Correlation was completed to look for relations between student characteristics and admission criteria, Table 18. A significant positive correlation ($p < .05$) was found between GRE Verbal Reasoning Score and tradition/non-traditional student characteristics ($r = .228, n=80, p = .042$). Thus, indicating that students that enter graduate school immediately following the completion of the undergraduate degree (traditional graduate student) scored higher on the GRE-Verbal Reasoning section compared to their nontraditional counterparts.

Table 22. Point Biserial Correlation between Demographic Factors and Graduate Admission Criteria

| | uGPA | GRE-V | GRE-Q | GRE-W |
|-----------------------------------|-------|-------|-------|-------|
| Ethnicity (n=79) | -.052 | .078 | .082 | -.053 |
| Gender (n=80) | -.086 | .037 | .192 | .025 |
| Traditional/nontraditional (n=80) | .115 | .228* | .066 | -.073 |
| Undergraduate degree (n=80) | .050 | .171 | .019 | .043 |
| Undergraduate institution (n=80) | .015 | -.036 | .081 | .120 |
| Ontime completion (n=80) | .016 | -.60 | -.133 | -.098 |

*Correlation is significant at the ($p < .05$) level

Point biserial correlations were completed to look at possible relations between student characteristics and student's academic and clinical outcomes. Table 19 highlight the point biserial correlation across categories.

Students' undergraduate degree had a significant negative correlation ($p < .05$) in relation to graduate GPA ($r = -.286, n= 80, p = .010$). Indicating that students with an undergraduate degree in a field other than communication sciences and disorders (CSD)

had a higher Graduate Grade Point Average (gGPA) than students that completed an undergraduate degree in CSD.

A significant negative correlation ($p < .05$) was found between students' diversity and cumulative clinical diagnostic skills ($r = -.227$, $n = 79$, $p = .044$), cumulative clinical treatment skills ($r = -.277$, $n = 79$, $p = .013$), and cumulative clinical professional practice, interaction, and personal qualities ($r = -.266$, $n=79$, $p =.018$). Indicating that students that self-identified as racial/ethnically diverse outperformed their white counterparts on the cumulative clinical evaluation in all three areas.

In addition, the length of time students took to complete the graduate program negative correlated ($p < .05$) with cumulative clinical evaluation in the area of professional practice, interaction, and personal qualities ($r = -.299$, $n = 80$, $p = .007$). Indicating that students that took longer to complete the program had higher cumulative scores in the area of professional practice.

Table 23. Point Biserial Correlation between Student Characteristics and Student Outcomes

| | gGPA | Praxis | Clinic dx | Clinic tx | Clinic Prof |
|-----------------------------------|--------|--------|-----------|-----------|-------------|
| Ethnicity (n=79) | -.087 | -.083 | -.227* | -.277* | -.266* |
| Gender (n=80) | -.069 | .143 | -.071 | -.022 | -.099 |
| Traditional/nontraditional (n=80) | .186 | .142 | -.052 | -.020 | .023 |
| Undergraduate degree (n=80) | -.286* | -.135 | .000 | .011 | -.163 |
| Undergraduate institution (n=80) | .017 | .078 | -.137 | .008 | .096 |
| Ontime Completion (n=80) | -.205 | -.071 | -.166 | -.164 | -.299** |

*Correlation is significant at the ($p < .05$) level

**Correlation is significant at the ($p < .01$) level

Phi Correlation

A Phi Correlation was completed to look for relations between student characteristics and personal statement/letter of recommendation (admission criteria) along with self-reported, via exit survey, prepared to practice. Traditional/non-traditional student characteristics had significant correlation to personal statement ($r = .271, n=80, p = .015$). This indicates that traditional graduate students' personal statements were rated higher than the non-tradition students ratings.

Traditional/nontraditional students characteristics had and a significant negative correlation to outcome measures of self-reported preparedness in the area of diagnostics ($r = -.316, n=57, p = .017$), and self-reported preparedness to provide treatment ($r = -.401, n=58, p = .002$). Indicating that non traditional students self-rated themselves as more prepared to practice in the area of diagnostics and treatment, then traditional students.

In addition, a significant negative correlation ($p < .01$) was found between on-time completion of the program and students self-report that they feel prepared to practice in the area of diagnostics ($r = -.357, n=80, p = .006$) and clinical treatment ($r = -.431, n=80, p = .001$) Indicating that students that took longer than the programs' published time frame to complete the program rated themselves higher in feeling prepared to practice then their cohort that graduated within the published time frame.

Table 24. Phi Correlation looking at Student Characteristics and Subjective Admission Criteria and Students' Self-reported Prepared to Practice

| | Personal Statement | Letters of recommendation | SR Prepared dx | SR prepared tx |
|----------------------------------|--------------------|---------------------------|----------------|----------------|
| Ethnicity (n=79) | .011 | -.132 | .118 | .096 |
| Gender (n=80) | .118 | .071 | --- | ---- |
| Tradition/nontraditional (n=80) | .271* | .050 | -.316* | -.401** |
| Undergraduate Institution (n=80) | -.124 | -.067 | -.128 | -.153 |
| Ontime completion (n=80) | .008 | .102 | -.357** | -.431** |

*Correlation is significant at the ($p < .05$) level

**Correlation is significant at the ($p < .01$) level

Summary

The statistical analyses revealed significant relations between some objective admission criteria and student academic and clinical outcomes with some variation noted by student characteristics. The results will be discussed and explored within the context of current research in Chapter 5.

Chapter 5: Conclusions and Discussion

Graduate admission for speech-language pathology is an opaque process that varies by program, department, and university (Posselt, 2016). In 2019-2020, 39% of the applicants received an offer of admission into a speech-language pathology graduate program (CAPCSD & ASHA, 2021). The relation between admission criteria and student's academic and clinical outcomes has piqued the interest of graduate admissions committees; however current research is limited, with inconsistency among findings (Forest & Naremore, 1998; Halberstam & Redstone, 2005; Kjelgaard & Guarino, 2012; Richardson, et. al., 2020).

Purpose

This retrospective quantitative study reviewed data from eighty (80) students who enrolled and completed a speech-language pathology graduate program between 2014-2020 from a Midwestern metropolitan university. The purpose of this study was to identify possible relations between admission criteria (undergraduate GPA, GRE scores, personal statement, and letters of recommendation) and students' academic and clinical outcomes (graduate GPA, Praxis, clinical outcomes). In addition, the study investigated how admission criteria and students' academic and clinical outcomes may varied by based on student characteristics (race/ethnicity, traditional/nontraditional, gender, undergraduate major, undergraduate university).

Research Questions

1. What is the relationship between speech-language pathology graduate admission criteria and students' academic and clinical outcomes?
2. What impact do the individual student characteristics such as race/ethnicity, gender, undergraduate degree, undergraduate institution attended, traditional/nontraditional graduate student, have on graduate admission criteria and students' academic and clinical outcomes?

Objective Admission Criteria and Student Outcomes

Grade Point Average (GPA)

A significant correlation was found between undergraduate GPA (uGPA) and graduate GPA (gGPA), $r = .252$, $b=80$, $p = .024$ ($p < .05$). Linear regression indicated that undergraduate GPA while significant may only account for 5.2% of graduate GPA. Similar relations between uGPA and gGPA have been identified in previous studies that look the predictive value of admission criteria and graduate outcomes for speech-language pathology programs (Forest & Naremore, 1998; Halberstam & Redstone, 2005). Forest and Naremore (1998) study indicated that undergraduate GPA (uGPA) could determine graduate success, as defined by student that had graduate GPA of at least 3.7 and scored above competency level on the Praxis speech-language exam, with 93.3% accuracy, through stepwise discriminate analysis. While Halberstam and Redstone (2005) found that undergraduate GPA in communication disorder courses strongly correlated with graduate GPA (gGPA) ($r = .72$, $p < .01$) as did overall undergraduate GPA

($r = .56, p < .01$). Halberstam and Redstone recommended using only undergraduate GPA in communication disorder courses as it also correlation with students being ranked high or low clinically, and a similar relation was not found using overall undergraduate GPA. Their conclusion was that undergraduate GPA in communication disorder courses can predict student's success academically and clinically (Halberstam & Redstone, 2005). Reed (2007) found no relation between undergraduate GPA (uGPA) and overall clinical practicum GPA (clinical outcomes). Reisfeld and Kaplan (2021) completed a systematic literature review to investigate the ability of admission measures to predict clinical skills from a variety of health sciences fields, including speech-language pathology. For their review undergraduate GPA included variations, including overall undergraduate GPA, undergraduate GPA of science and nonscience course work, final 60 credit hours, major undergraduate GPA and weighted undergraduate GPA, all variation were considered undergraduate GPA for this literature review. They found that in 16 out of 20 (80%) studies, undergraduate GPA predicated some graduate academic outcomes, whereas 11 out of 23 (48%) studies found that undergraduate GPA predicted some clinical outcomes.

The present study did not find a relation between undergraduate Grade Point Average (uGPA) and the Praxis Speech-Language Pathology score. However, Kjelgaard and Guarino (2012) and Reed (2007) found relationship between overall undergraduate GPA (uGPA) and Praxis Speech-Language Pathology score. Whereas Baggs and Colleagues (2014) found a correlation between undergraduate GPA in communication disorder courses along with physical sciences courses and Praxis Speech-Language score.

Implications of how undergraduate Grade Point Average is calculated appears to be variable along with how it correlated to student's academic and clinical outcomes.

This program currently, looks at overall undergraduate GPA so a comparison was not completed to explore overall undergraduate GPA and undergraduate GPA of communication disorder courses and ASHA required science courses. Graduate committees may benefit from clearly defined what undergraduate GPA means for their program so that applicants understand how it is used as part of the application process. In addition, consensus across the field may be beneficial for program utilization of current research.

Graduate Record Examination (GRE)

The results of this study found a significant correlation ($p < .01$) between GRE-Verbal Reasoning and Praxis Speech-Language score, ($r = .418$, $n = 80$, $P = .000$) along with GRE-Analytical Writing and the Praxis Speech-Language score, ($r = .299$, $n = 80$, $P = .007$). Previous studies within the field of speech-language pathology have found similar correlations between the GRE and Praxis speech-language score. Baggs and colleagues (2015) using a multiple stepwise discriminant analyses determines that GRE-Verbal, GRE-Quantitative Reasoning and the GRE-Total score all correlated to the Praxis speech-language score. Reed (2007) used multiple regression analysis to determine the GRE – Verbal Reasoning subtest correlated to Praxis speech-language score. This study found that a student who scored 400 or above on the GRE-Verbal Reasoning were 2.4 times more likely to pass the Praxis speech-language assessment on their first attempt than a student with a GRE-Verbal Reasoning score of less than 400.

A significant correlation, $p = .049$ ($p < .05$) was found between GRE- Analytical Writing and Cumulative Clinical Cumulative Diagnostic Rating. This was the only area

of clinical practice where a significant relationship was found between objective admission criteria and clinical outcomes. The GRE- Analytical Writing does focus on critical thinking, along with one's ability to articulate and support complex ideas (ETS, 2021). These attributes may relate to the ability to think critically and solve clinical problems.

Limited studies have found links between GRE and clinical outcomes. In part because clinical success is broad and has been interpreted differently across studies. Reisfeld and Kaplan (2021) systematic literature review looking the ability of admission criteria to predict clinical skills in graduate student from a variety of health science fields, including speech-language pathology, found that the link between standard assessment, such as the GRE and academic outcomes was clearly defined, however, the link between GRE and clinical outcomes was unclear. Kjelgaard and Guarino (2012) found that the GRE-Qualitative and undergraduate GPA was predictive of clinical aptitude. Baggs and colleagues (2015) though stepwise discriminant analysis the GRE-Quantitative score could predict clinically successful students with 57% accuracy.

Subjective Admission Criteria and Student Clinical and Academic Outcomes

Personal Statement

The results of this study indicated no significant correlations found between personal statement, admission criteria, and students' academic or clinical outcomes. There are limited studies that look at the correlation between personal statements and students' academic and clinical outcomes. Reisfeld and Kaplan (2021) review of the

literature indicated that they found 10 studies (out of 28 articles) that used essays as part of admission criteria and only two studies (20%) found that the essay correlated to academic outcomes, while five (50%) found that essay did not predict student outcomes (academic or clinically). There are many variables that impact the ability to generalize student essay across programs. There is not a consensus in what is asked of the student nor a standardized scoring method across programs. Graduate program committee should be thoughtful in what the purpose of the student essay is and how it adds value to the applicant's profile.

In addition, if personal statements are utilized, programs may benefit from a structured scoring rubric and ensuring reliability across readers like the Gates Millennium Scholars Program for example. This program successfully uses personal essay to assess noncognitive variables with statistically significant relationship to grades and retention in higher education (Sedlacek & Sheu, 2008).

Letter of Recommendation

The results of this study indicated no significant correlations found between letters of recommendation and student academic or clinical outcomes. Limited number of admission studies have looked at letters of recommendation and student academic and or clinical outcomes. Halberstam and Redstone (2005) found that letters of recommendation predicted graduate GPA ($p < .05$). They also found that letters of recommendation correlated with faculty ranking of students as high (academically and clinically) or low (academically and clinically). They used a four-point scale to evaluate letters of recommendation which included: status of recommender, apparent depth of

knowledge of the applicant's ability, reasons for recommending the applicant and level of enthusiasm. Mahwald and colleagues (2017) also reported a correlation between higher rated letters of recommendation and student's GPA. There is limited research looking at letters of recommendation and student outcomes in speech-language pathology graduate programs and the results of the current studies lack congruency (Halberstam & Redstone, 2005; Mahowald et. al, 2017, Reisfeld & Kaplan, 2021).

In addition, there is a lack of consistency in the way programs rate and weigh letters of recommendation. A recent study by Newkirk-Turner and Hudson (2021), looked Implicit bias and systematic differences in letters of recommendation for Communication Sciences and Disorders Graduate Programs. This study reviewed letters of recommendation for the presence of implicit bias at a historically Black university. Interestingly this study found that the number of perceived bias phrases within the letter of recommendation were not correlated to the applicant's undergraduate GPA, undergraduate institution nor the length of the letter of recommendation. However, applicants with fewer biases in their letter of recommendation were offered admission at a higher rate than the students with more instances of biases found. This study further highlights the subjective nature and negative implication that occurs secondary to requirement of letters of recommendation as part of the admission process (Newkirk-Turner & Hudson, 2021).

Currently, the majority (over 90%) of graduate program in speech-language pathology require letters of recommendation as part of the admission requirements. It would be advantageous of graduate programs to be reflective of letters of

recommendation and if they are adding value to the admission process and fair and equitable across applicants.

Student Characteristics

Racial/Ethnic Diversity

A significant negative correlation was found between ethnicity and clinical outcomes, indicating students who self-identified as being racially or ethnically diverse scored higher than their peers on all three areas of clinical practice (diagnostic, clinical treatment and clinical professional practice, interaction, and personal qualities). Only 8% (6/79) of the graduates identified as being from a diverse racial or ethnic background. This is below the national average for minority student enrollment in speech-language pathology graduate program. The national average was reported to be between 16.6%-23.3% during the academic years reviewed for this study (CAPCSD & ASHA, 2021b).

Increasing the diversity of graduate students admitted to speech-language pathology graduate programs is a focus of ASHA. The American Speech-Language-Hearing Associations 2021 Strategic Objectives #6 is “increase diversity/equity/inclusion (DEI) within the Association and the discipline” (ASHA, 2021b). Speech-language pathology graduate programs have begun to make a concerted effort to respond. During the 2019-2020 academic year, 23.3% of the graduate students enrolled identified as a racial/ethnic minority student (CAPCSD & ASHA, 2021). Ensuring admission process is welcoming and attainable by diverse students is essential to build upon this current trend

and work to ensure that the speech-language pathology workforce is representative of the community.

Gender

There were no significant findings related to gender and graduate admission nor graduate academic or clinical outcomes found. However, there was only one male included in this study. It is important to note that the gender inequality is not limited to this program. During the 2019-2020 program year, only 4% of the entering graduate student were male. This has remained relatively consistent across program and time (CAPCSD & ASHA, 2021).

Traditional/non-traditional

Traditional students, those who completed their undergraduate degree in communication sciences and disorders and enrolled in a graduate program immediately, had significantly stronger ratings on their personal statements ($p = .015$) as part of the application process and scored higher on the GRE- Verbal ($p = .042$) than non-traditional students. However, non-traditional students' self-ratings of preparedness to practice, in the areas of clinical diagnostics and treatment, were significantly higher than traditional student at the conclusion of their graduate program.

Non-traditional graduate students tend to be older and have worked prior to returning to an academic program. Thus, they may be highly motivated to complete the program. However, Halberstam and Redstone (2005) did not find a difference between non-traditional and traditional student outcomes.

Undergraduate degree

A significant negative correlation was found between undergraduate degree and graduate GPA, indicating students who obtained an undergraduate degree in a field outside of communication sciences and disorders obtained a higher graduate GPA (gGPA). This is similar to findings of Forrest and Naremore (1998) that found the second most important factor in determining graduate success was undergraduate major, specifically, students with an undergraduate degree outside of communication sciences and disorders (CSD) field. In addition, Kjelgaard and Guarino (2012) found that SLP majors enter the program with statistically higher GPA, however students with a degree in CSD had statically weaker graduate GPA (gGPA).

Undergraduate Institution

There were no significant findings related to undergraduate institution and graduate admission criteria nor student academic or clinical graduate outcomes. The participants in this study were from eleven different states and twenty different undergraduate institutions, however 49% of the students completed their undergraduate and graduate degree at this program.

On-time Completion of graduate program

Students who took longer than expected based on program completion timeline of six semesters, to complete the program, self-reported they felt competent in the area of diagnostics ($p = .017$) and clinical treatment ($p = .002$) compared to student that graduated within the published time frame. In addition, the cumulative clinical evaluation in the

area of professional practice, interaction and personal qualities was significantly ($p = .007$) higher for students who took longer to complete the program than students who graduated within the published time frame. Students have a variety of reasons for taking longer to complete the program, secondary to personal reasons or academic reasons. This may be secondary to increase clinical experiences and decrease academic course load per semester, thus providing student additional support and time to feel confident and competent with clinical practice. The American Speech-Language-Hearing Association (2020) Ad Hoc Committee on Graduate Education, stressed the need of the profession to consider lengthening the duration of the graduate program to ensure graduate students are competent across the lifespan and the “Big Nine.”

Study Limitations

The generalization of the results may be limited. The data was collected from one speech-language pathology graduate program, with limited sample size and diversity. Some of the outcome variables such as the cumulative clinical evaluation (diagnostics, treatment, and professional practice), is based on the program’s chosen rating scale. Items rated are cross walked with CAA and CFCC standards; however, measurement of cumulative clinical practice may differ by program. The graduate student self-rating is based on the exit interview for this program. Furthermore, academic and clinical success may vary by type of institution, student characteristics and the university setting which may impact the generalization of findings across institutions.

Implications for further research

This study adds to research investigating traditional graduate admission practices and student outcomes (academic and clinical). While this study further supports the use of objective traditional admission criteria to predict student academic outcomes, graduate GPA and passing the Praxis Speech-Language Pathology test, the variability based on student characteristics provides a look at the complexity of graduate admission and demonstrates potential need to look at candidates through a holistic lens. In addition, the field would benefit from consensus around admission criteria. Successful graduates must be career-ready by possessing both academic and clinical aptitude which traditional admission criteria did not capture in this study. There is a need within the field of speech-language pathology to further explore measures to identify clinical aptitude during the admission process. This may include looking at holistic admission review and student (clinical and academic) outcomes.

Conclusion

This retrospective quantitative study was conducted to look at the relation between speech-language pathology graduate admission criteria and student academic and clinical outcomes. This study found the objective admission variables, i.e., undergraduate GPA and GRE scores had a stronger correlation with academic outcomes. Specifically, undergraduate GPA (uGPA) correlated to graduate GPA (gGPA) and the GRE scores correlated to Praxis Speech-Language Pathology score. No correlation was found between objective admission criteria and student academic nor clinical outcomes. However, student characteristics did impact students' academic and clinical outcomes,

further highlighting the importance of graduate admission committees looking at potential graduate students through a holistic lens rather than relying on tradition admission criteria alone.

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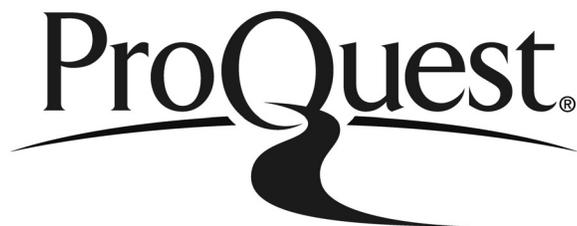
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