

Old Dominion University ODU Digital Commons

Communication Disorders & Special Education
Theses & Dissertations


Communication Disorders & Special Education

Winter 2018

Predicting Speech-Language Pathology Graduate Student Success: Executive Functions and Standardized Admission Tests

Jane E. Roitsch
Old Dominion University

Follow this and additional works at: https://digitalcommons.odu.edu/cdse_etds

 Part of the [Special Education and Teaching Commons](#), and the [Speech Pathology and Audiology Commons](#)

Recommended Citation

Roitsch, Jane E.. "Predicting Speech-Language Pathology Graduate Student Success: Executive Functions and Standardized Admission Tests" (2018). Doctor of Philosophy (PhD), dissertation, Comm Disorders & Special Educ, Old Dominion University, DOI: 10.25777/r007-wv25
https://digitalcommons.odu.edu/cdse_etds/5

This Dissertation is brought to you for free and open access by the Communication Disorders & Special Education at ODU Digital Commons. It has been accepted for inclusion in Communication Disorders & Special Education Theses & Dissertations by an authorized administrator of ODU Digital Commons. For more information, please contact digitalcommons@odu.edu.

PREDICTING SPEECH-LANGUAGE PATHOLOGY GRADUATE STUDENT SUCCESS

PREDICTING SPEECH-LANGUAGE PATHOLOGY

GRADUATE STUDENT SUCCESS:

EXECUTIVE FUNCTIONS AND STANDARDIZED ADMISSION TESTS

by

Jane E. Roitsch
Executive Master of Business Administration
Case Western Reserve University, 2012
Master of Arts in Speech-Language Pathology
The Ohio State University, 1999
Bachelor of Arts
Butler University, 1996
Bachelor of Arts,
Butler University, 1994

A Dissertation
Submitted to the Faculty of Old Dominion University
in Partial Fulfillment of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY IN EDUCATION

SPECIAL EDUCATION CONCENTRATION

OLD DOMINION UNIVERSITY

December 2018

Approved by:

Dr. Anastasia Raymer (Chair)

Dr. Robert Gable (Member)

Dr. Kimberly Murphy (Member)

Dr. Silvana Watson (Member)

ABSTRACT

PREDICTING SPEECH-LANGUAGE PATHOLOGY GRADUATE STUDENT SUCCESS:
EXECUTIVE FUNCTIONS AND STANDARDIZED ADMISSION TESTS

Jane E. Roitsch
Old Dominion University, 2018
Director: Dr. Anastasia Raymer

Within the next three years, the number of available speech-language pathology (SLP) jobs is projected to increase by 18% (Bureau of Labor Statistics, 2018). The most logical response to the escalating market demand would be to increase the number of students admitted into SLP graduate programs. However, this may not be as simple as it sounds.

Successful training of graduate SLP clinicians requires the professional, emotional, financial, and time commitments of the program's clinical and academic faculty. The accreditation status of graduate SLP programs is based in part on graduation completion rates and students passing the national examination in SLP, the Praxis II. Such benchmarks and the pressure to increase a program's admission class size place greater importance on the need to ensure the best students are selected for admission. Thus, graduate SLP programs need to be certain that their vetting process for graduate school admission is effective and appropriate if they plan to increase the number of students who successfully complete programs and meet certification and accreditation requirements.

Undergraduate grade point average (UGPA) and Graduate Record Exam (GRE) scores are standardized means used commonly to predict graduate students' academic ability. However, SLP graduate programs require students to demonstrate competence not only academically, but also clinically. Tests of executive functions (EFs) have been used as predictors of ability as they

assess areas of cognitive ability essential for decision-making (Vestberg, Gustafson, Maurex, Ingvar, & Petrovic, 2012; Kirova, Bays, & Lagalwar, 2015). This research study examined EF measures as unique, additional means to predict student ability to succeed in SLP graduate programs. The purpose of this study was to investigate what relationships, if any, exist between: (a) academic admissions criteria, (b) tests of EFs, and (c) academic and (d) clinical outcomes.

An observational design using stepwise multiple regressions was used to determine the strength of the relationship between the variables (i.e., current SLP graduate school admissions criteria, tests of EFs, and clinical and academic outcomes) by identifying the model(s) of best fit. Findings indicated that objective and subjective EF measures were highly predictive of successful academic and clinical outcomes for graduate SLP students. Implications for future research are also provided.

Copyright, 2018, by Jane E. Roitsch, All Rights Reserved

Continuous effort – not strength or intelligence – is the key to unlocking our potential.

-Winston Churchill

This dissertation is dedicated to all the students who did not get the highest grades in class but have become great clinicians. I see you. I know you. I am you.

ACKNOWLEDGMENTS

I am forever grateful to my mentor and dissertation chair, Dr. Anastasia Raymer. Without fail, she has believed in me, inspired me, and guided me by her words and deeds.

Dr. Robert Gable has been a pillar of strength and wisdom to so many before me, and undoubtedly so many after me ... I have learned from him and am grateful he accepted my invitation to be on my dissertation committee.

Dr. Kimberly Murphy has provided me with a model of what a newly-minted SLP PhD should do and has set the bar high for those of us coming into this level of the profession. Her kindness, intellect, and support has been unfailing. Kim's insight while serving on my dissertation committee has been priceless. The support of Dr. Morin, Dr. Richels, Dr. Johnson, and Dr. Michalek during my doctoral program has been constant and proved invaluable to me. Dr. Silvana Watson introduced executive functions to me through a special education lens and sparked my interest in learning more about these cognitive functions. I am grateful for her insight and her agreeing to also sit on my dissertation committee. Had I not taken Dr. Ann Maydosz's course and connected immediately with her kind soul and dedicated heart, I would be in a different place for sure right now. Dr. Tonelson, thank you also for your time, your humor, and support. And to my statistics angel, Amanda, words cannot express my gratitude for your patience and kindness.

I am also indebted to the special education faculty at Old Dominion University for taking me into their program and providing me the opportunity to learn from them. My PhD comrades, Mindy and Alisha and Annemarie supported me and encouraged me when I needed it most. I hope I have done the same for you. The clinical staff in ODU's SLP program deserves my thanks

for their support and assistance. And to my friend, Sheryl Spence, thank you for always being there for me with a smile and a laugh.

Thank you to my Mom and Dad for always believing in me and cheering me on, even when they may not have understood why I have stayed in school so long, or better yet, why I kept going back. To my dear Lisa, you led the charge, so here I am. To my husband, Eric, you always think I can climb the highest mountain and swim the deepest sea ... thank you for coming with me along this journey. And to my daughter, Reagan, thanks for being you. You're a big reason I did this, because I want you to be as proud of me as I am of you. Lastly, to my late Grandma and brother -- I know you're up there smiling now. Thank you for the times we had and the inspiration you continue to provide.

NOMENCLATURE

ASHA – American Speech-Language-Hearing Association

CAA - Council on Academic Accreditation

CCC- Certificate of Clinical Competence

CEFI-Adult – Comprehensive Executive Function Inventory-Adult

EFs- Executive Functions

GGPA – Graduate Grade Point Average

GRE - Graduate Record Examination

GRE-A – Graduate Record Examination, Analytical

GRE-Q – Graduate Record Examination, Quantitative

GRE-V – Graduate Record Examination, Verbal

SLP – Speech-Language Pathologist

TK - Tacit Knowledge

UGPA – Undergraduate Grade Point Average

VIF – Variance Inflation Factor

WCST-CV4 – Wisconsin Card Sorting Test, Computer Version 4

TABLE OF CONTENTS

	Page
LIST OF TABLES.....	x
INTRODUCTION.....	1
OVERVIEW OF THE PROBLEM.....	2
STUDY RATIONALE.....	12
PURPOSE.....	13
BACKGROUND OF THE STUDY.....	15
REVIEW OF THE LITERATURE	15
LIMITATIONS OF EXISTING STUDIES.....	28
METHODOLOGY.....	32
RESEARCH QUESTIONS.....	32
RESEARCH DESIGN.....	33
STUDY POPULATION.....	33
DATA COLLECTION.....	34
INSTRUMENTS.....	35
STUDY VARIABLES.....	37
DATA ANALYSIS.....	39
RESULTS.....	43
DESCRIPTIVE STATISTICS.....	44
STEPWISE REGRESSION RESULTS.....	48
DISCUSSION.....	56
OVERVIEW OF FINDINGS.....	57

IMPLICATIONS.....61

LIMITATIONS.....64

REFERENCES.....67

APPENDICES

 A. Literature Review Chart82

 B. Academic Variables Correlation Table91

 C. Clinical Variables Correlation Table.....93

 D. IRB Letter.....96

VITA.....98

List of Tables

Table 1.1: CAA Student Requirements

Table 1.2: Characteristics of Executive Functions

Table 1.3: Types of Conditions Assessed and Treated by SLPs

Table 4.1 - Descriptive Statistics for All Variables

Table 4.2: Stepwise Regression Results for Dependent Variable GGPA

Table 4.3: Model of Best Fit for Dependent Variable GGPA

Table 4.4: Stepwise Regression Results for Dependent Variable Praxis II

Table 4.5: Model of Best Fit for Dependent Variable Praxis II

Table 4.6: Stepwise Regression Results for Dependent Variable EBSRs

Table 4.7: Model of Best Fit for Dependent Variable EBSRs

Table 4.8: Stepwise Regression Results for Dependent Variable Clinic 1 Final

Table 4.9: Model of Best Fit for Dependent Variable Clinic 1 Final

Table 4.10: Stepwise Regression Results for Dependent Variable Clinic 2 Final

Table 4.11: Model of Best Fit for Dependent Variable Clinic 2 Final

Table 4.12: Stepwise Regression Results for Dependent Variable Clinic 3 Final

Table 4.13: Model of Best Fit for Dependent Variable Clinic 3 Final

Table 5.1: Significant Variables

It is not enough to know the kind of disorder a person has,
one must know the kind of person who has the disorder.

--Charles Van Riper, *Speech-Language Pathologist*

CHAPTER ONE

INTRODUCTION

Chapter one describes the challenges facing current speech-language pathology (SLP) graduate schools in graduate admissions, in particular by discussing the gaps between assessments of academic ability and clinical competence in the healthcare professions. To provide the highest quality care, healthcare professionals must have strong clinical skills along with solid academic knowledge. Identifying graduate students who have the potential for these qualities is a considerable challenge in the admissions process. Most agree that decision-making and judgment capabilities are key cognitive abilities successful clinicians possess (Kienle & Kienle, 2011; Elstein & Schwartz, 2002). Conversely, it has been suggested that deficits in decision-making and judgment may be linked to (a) cognitive limitations inherent to memory and attention abilities, (b) challenges that belie identifying important behaviors, and (c) poor integration of information (Politser, 1981). It stands to reason that assessment of these types of cognitive skills, including executive functions (EFs), may provide insight into prospective healthcare providers' clinical abilities. Yet, current literature has yet to link EFs and clinical skills. The purpose of this research and succeeding research questions was to address these gaps, specifically as applied in the field of SLP. This chapter provides an overview of the problem, identifies limits of the current literature, defines the research study rationale, names the problem statement, and lists the research questions asked in this study.

Overview of the Problem

Market demand. From 2012 to 2022, it is projected that there will be nearly 2.4 million jobs in the United States requiring, at minimum, a graduate degree (Bureau of Labor and Statistics, BLS, 2017). The SLP profession is listed as one of the top 12 occupations requiring a graduate degree anticipated to add a significant number of new jobs in the next decade. As SLPs also command a median annual wage of \$76,610 (BLS, 2018; i.e., a salary higher than that of the average American worker, whose annual wage is \$37,040; ASHA Leader, 2018), the SLP profession is an attractive career path, notwithstanding the requirement for a master's degree to be licensed in virtually every state in the U.S. Not surprisingly, given the strong job outlook, applications to graduate SLP programs in the United States are escalating, nearly doubling in the past decade. In 2016-2017, there were 64,000 applications submitted to the nation's 273 master's degree SLP programs, an increase of 21.2% since the 2010-2011 school year (Council of Academic Programs in Communication Sciences and Disorders & American Speech-Language Hearing Association, 2018).

These increasing admission numbers and market demands require graduate SLP programs to screen more candidates vying for admission. In fact, of the 64,000 applicants to SLP graduate school programs in the 2016-2017 school year, only 17,388 students (roughly 27%) were admitted. Even more notable in 2016-2017, of the 9,532 individuals who took the national examination in SLP (i.e., the Praxis II examination), 543 or 5.7% of these individuals did not pass (ASHA, 2017). Nearly 6% may not seem like a large number, but when SLP positions remain unfilled in the marketplace, any percentage is impactful. Thus, more than ever, graduate SLP programs are faced with the apparent need to adjust the current admissions process to better predict graduate student success.

Current SLP admissions process. Along with letters of recommendation and a biographic sketch or essay, most United States SLP programs utilize grade point average (GPA) and the Graduate Record Examination (GRE) as benchmarks to consider candidates for admission (Steffani & Slavin, 1997; ASHA, 2017). Although such scores are efficient ways to assess students' academic abilities, some experts have questioned the effectiveness of these standardized assessments, especially the GRE, in predicting graduate performance (Sternberg & Williams, 1997). Even when standardized academic tests have been shown to moderately predict first-year grades, they have not predicted graduation rates, especially for those seeking advanced degrees (Moneta-Koehler, Brown, Petrie, Evans, & Chalkley, 2017; Sealy, Saunders, Blume, & Chalkley, 2018). Based on the results of the GRE, graduate programs have been reported to limit the admission of women and minorities often in the science fields (Miller & Stassun, 2014).

Research specific to the field of SLP has provided conflicting results regarding factors that are predictive of successful outcomes in graduate school, typically measured as graduate grades (GGPA), clinical course grades, or the culminating national examination in SLP, the Praxis II. Forrest and Naremore (1998) found Undergraduate Grade Point Average (UGPA) to be the strongest indicator of graduate SLP student success (i.e., UGPA predicted graduate SLP student academic achievement with 93% accuracy), while GRE scores were less predictive indicators of success. Conversely, Reed (2007) found GRE-V & GRE-V+Q most significantly correlated to clinical practicum grades and also correlated to Praxis II scores. Ryan, Morgan, and Wacker-Mundy (1998) found GRE Total scores weakly predicted graduate SLP performance, and SLP GPA was most significantly correlated to GGPA. Interestingly, although Kjelgaard and Guarino (2012) found UPGA and GRE scores predicted success on the Praxis II examination, undergraduate SLP majors demonstrated significantly lower academic scores throughout the

program at the graduate level ($M = 3.69$; $SD = .26$) than those who entered the program as non-SLP majors ($M = 3.76$, $SD = .17$), $F(1, 121) = 4.25$, $p = .041$, $\eta^2 = .03$.

Most recently, Boles (2018) reported the regression model that predicted SLP graduate school success included three variables; GRE-V and GRE-Q scores and the students' grade in the speech and language development course taken before graduate school admission ($p = .004$). Conversely, Troche & Towson (2018) found that when weighted equally, UGPA, GRE-V, GRE-Q, GRE-W none predicted SLP graduate student academic success as (i.e., GGPA) or clinical scores (i.e., the school's clinical checkpoint and Clinical Skill Acquisition Rubric). Interestingly, when these factors were differentially weighted, each factor *was* predictive, suggesting the possible need to weigh admissions criteria more appropriately and effectively during the graduate SLP admissions process.

Based on these diverse research findings within SLP programs, it appears that the field of SLP could be a profession where the GRE and other markers for admission may not accurately, nor at the very least, consistently, reflect potential graduate school success, especially pertaining to professional acumen and clinical ability. Additionally, as will be shown, admissions criteria to SLP programs do not mirror graduation and accreditation requirements. Simply stated, academic scores alone may not be the best means to identify successful graduate students. In fact, healthcare professions have long named the importance of additional abilities such as clinical skills as markers of successful clinicians.

Clinical skills. The ability to demonstrate clinical success involves knowledge and solid clinical skills. Clinical reasoning is a complex cognitive process in which knowledge specific to the discipline is used to guide information gathering, assess its significance, and determine the most appropriate next steps (Simmons, 2010). Clinical judgment has been named as the basis of

the medical profession (Kienle & Kienle, 2011). In psychology, the clinical skills of clinical problem solving and diagnostic decision-making drive research and impact evidence-based practice (Elstein & Schwartz, 2002). Thus, professional healthcare organizations and schools that train healthcare professionals (i.e., physicians, dentists, nurses, psychologists, psychiatrists, hospital social workers, physical and occupational therapists, and SLPs), recognize the importance of clinical skills. As various terms are used to define clinical skills (i.e., clinical reasoning, clinical judgment, and/or clinical decision-making), this work will utilize the term “clinical skills” to refer to this important skill set.

One need only look to the organizations founded, research published, and curriculums designed to recognize the importance healthcare professions place on accurate clinical skills. The Society for Medical Decision Making (SMDM) is an organization dedicated to improving healthcare outcomes through understanding the importance of the clinical skills of decision-making in providing patient care. Listed among its strategic plan goals for 2016-2020 is to provide a training group for scholars in the medical decision-making field, and to foster and promote research for medical/healthcare decision-making (SMDM, 2018).

Other healthcare professions such as psychology, counseling, and nursing have long studied clinical skills via the accuracy and reliability of clinicians’ judgments. Whether comparing the clinical decisions of novice psychologists to seasoned practitioners (Ganzach, 1997), or analyzing overconfidence biases when self-rating clinical judgment accuracy (Miller, Spengler, Spengler, & Tracey, 2015), the field of psychology has provided robust literature regarding clinical skills involving clinical judgments. Studies of counseling programs have examined their admissions criteria and its success identifying predictors of success in the Counselor Preparation Comprehensive Exam (CPCE; Hatchett, Lawrence, & Coaston, 2017;

Schmidt, Homeyer, & Walker, 2011; Smaby, Maddux, Richmond, Lepkowski, & Packman, 2005). Similarly, the nursing field has worked to integrate clinical skills such as judgment assessments and training into their school curriculums (Bashford, Shaffer, & Young, 2012; Kantar & Alexander, 2012; Victor, 2017). Likewise, the American Physical Therapy Association (APTA), the American Occupational Therapy Association (AOTA), and ASHA's consensus statement requires clinicians to hone their clinical skills. Students are required to make decisions and provide therapy based on clinical reasoning, judgment, and use of objective data (APTA, n.d¹).

Although the field of SLP requires clinical skills, few studies have investigated potential predictors of clinical skills in future clinicians. As will be shown, clinical skills are expected of SLPs (based on the requirements and standards of governing bodies and accrediting institutions), but rarely assessed during the SLP admissions process. In the sections that follow, these SLP expectations are discussed, and EF tests are introduced as possible tools to better indicate clinical skill potential for those entering the profession.

Expectations of SLPs. As with similar healthcare professions (e.g., physical therapy, occupational therapy), SLPs are charged with providing services to growing numbers of students in the schools with complex learning and medical needs and managing increasingly challenging pediatric and adult cases in hospitals and outpatient settings. Hence, the ability to incorporate appropriate clinical skills (e.g., decision-making) is a professional necessity. For SLPs, the Council on Academic Accreditation (CAA) has worked to identify the core components of clinical skills through their standards of professionalism that focus on clinical judgment and clinical reasoning. Along with academic requirements, students achieve their Certificate of Clinical Competence (CCC) by demonstrating certain professional knowledge, skills, and

practice competencies (CAA, 2017) (See Table 1.1). Combined with core academic abilities, it is essential that successful SLPs possess clinical skills, such as initiating, decision-making, strategizing, organizing, flexibility, and abstract reasoning skills, all of which require the use of EFs (Norman & Shallice, 1986).

Table 1.1

CAA Professional Practice Competency Requirements

Accountability

Integrity

Effective Communication Skills

Clinical Reasoning

Evidence-Based Practice

Concern for Individuals Served

Cultural Competence

Professional Duty

Collaborative Practice

Executive Functions

Although a single, agreed-upon definition of executive functions remains to be determined (Jurado & Rosselli, 2007), the accepted components of EFs generally include inhibition, interference control, working memory, and cognitive flexibility (Diamond, 2013), and this will serve as the working definition of EFs for this paper. EFs have been named as core control activities that supersede all other cognitive processes (Denckla & Reader, 1993), and also are considered essential components of metacognition (i.e., an individual's awareness of their

own thought processes; Barkley, 1997). Most practitioners and researchers agree that EFs can be broken down into what Barkley, Murphy, and Fischer (2008) call “areas” and Brown (2005) calls “clusters.” As noted in Table 1.2, the majority of EF “cluster” categories (i.e., working memory, self-monitoring, self-regulating, and planning/organizing) are also EF “areas.”

Table 1.2

Executive Functions

Areas of EFs (Barkley et al., 2008)	Nonverbal working memory	Internalization of speech (verbal working memory)	Self-regulation of affect, motivation, and arousal	Planning and generativity		
Clusters of EFs (Brown, 2005)	Utilizing working memory and accessing recall	Monitoring and self-regulating action	Regulating alertness, sustaining effort and processing speed	Organizing, prioritizing, and activating for tasks	Managing frustration and modulating emotions	Focusing, sustaining and shifting attention to task

Although EFs are likely required in order for intelligent behaviors to occur, researchers have found that available intelligence tests may not equally or appropriately assess EFs (Ardila, Pineda, & Rosselli, 2000; Friedman, Miyake, Corley, Young, Defries, & Hewitt, 2006). Despite this, the connection between academic success, EFs, and metacognitive skills has been established in the literature (Dunlosky & Metcalfe, 2009; Flavell, 1979; Serra & Metcalfe, 2009). Understandably, research regarding EFs and learning has expanded.

The increased focus on investigations designed to better understand the contribution of EFs to learning, behavior, and cognition was illustrated by Calhoun (2006) during his search for the phrase “executive functions.” He found two articles containing the phrase “executive functions” in a search of the PsychINFO database from 1970 to 1980; 35 from 1980 to 1990;

and, nearly 2,500 were published between 1997 and 2007. The current researcher identified 7,998 articles when the same search terms included the years from 2007 to 2017 (American Psychological Association, APA PsychNET, 2017).

The growing research on EFs stems from the purported role of EFs in multiple areas of academic and cognitive functioning. In older children, scholastic abilities have been shown to have significant associations with certain EFs (St. Clair-Thompson & Gathercole, 2006). Some authorities have suggested the use of EFs as means to assess academic ability, identify social skills, and even predict emotional stability (Alduncin, Huffman, Feldman, & Loe, 2014; Best, Miller, & Naglieri, 2011; Blakemore & Choudhury, 2006). Not surprisingly, correlations have been found between EFs and physical performance outcomes such as gait speed and walking task complexity (Coppin et al., 2006) and how inhibition of responses relates to motor control (Livesey, Keen, Rouse, & White, 2006). Further, connections have been established between EFs and cooperative social behavior in children (Best, Miller, & Jones, 2009; Ciairano, Visu-Petra, & Settanni, 2007). As EFs are shaped by experiences beginning at a very early age (Shonkoff, 2011), most agree on the importance of understanding the impact of EFs on student skills (e.g., learning and performance). In summary, EFs have been shown to provide effective means of predicting student performance, both academically, cognitively, socially and interpersonally. As clinical skills require sufficient cognitive, social, interpersonal abilities, EF assessments could provide necessary information as a step in the competitive SLP graduate school admissions process.

Further, EFs deserve consideration in the SLP profession due to the diversity of individuals whom SLPs assess and treat. The CAA requires that student clinicians demonstrate the ability to assess and provide treatment for speech, language, and swallowing disorders and

differences associated with myriad developmental and acquired learning and medical conditions in individuals ranging in age from newborns to the elderly (See Table 1.3).

Table 1.3

Types of speech, language, and swallowing disorders and differences assessed and treated by SLPs (CAA, 2017).

Articulation Fluency

Voice and resonance (including respiration and phonation)

Receptive and expressive language (phonology, morphology, syntax, semantics, pragmatics, pre-linguistic communication, and paralinguistic communication) in speaking, listening, reading, writing, and manual modalities

Hearing, including the impact on speech and language

Swallowing (oral, pharyngeal, esophageal, and related functions, including oral function for feeding; orofacial myology)

Cognitive aspects of communication (e.g., attention, memory, sequencing, problem solving, executive functioning)

Social aspects of communication (e.g., behavioral and social skills affecting communication)

Augmentative and alternative communication needs

Research gaps. Although clinical skills are required for graduation and licensure, research involving assessment of SLPs' potential for clinical skills is limited. Further, research that objectively evaluates an aspiring graduate SLP's clinical judgment and clinical reasoning prior to admission to graduate school is as yet unavailable. Early studies in the field of SLP have emphasized that it is unclear what types of test scores, if any, predict academic SLP success in graduate school. The existing research has primarily focused on predicting academic, not clinical outcomes. Further, evidence-based tools that measure a graduate SLP student's ability to

incorporate clinical judgment and reasoning have not been identified. Although there is a significant body of research on EFs, these studies have focused primarily on children and adults with disabilities or adults with acquired conditions. Even though EFs have been identified as skills that oversee cognitive flexibility and processing, (i.e., skills needed for clinical success), little data are available on the application of EFs in adults without disorders. Accordingly, there is a need to investigate the utility of EF scores for aspiring graduate students to assess potential clinical abilities.

EF Measures

As a standardized and agreed-upon definition of EF remains elusive (Jurado & Rosselli, 2007), it is not surprising to learn that a number of standardized tests have been devised to assess varying areas of EFs but there is no gold standard for assessing EFs. In their review of the most commonly used EF instruments for adults, Chan, Shum, Toulopoulou, and Chen (2008) identified more than 20 tests devised based on various EF theories (e.g., of attention, working memory, Luria's model of mental processes, etc.). Further, the authors found that the components these EF instruments assessed were as varied as their theoretical design (e.g., motor initiation, sequencing, inhibition, planning, perseveration, etc.).

For this study, the computer version of the Wisconsin Card Sorting Test (WCST; Heaton, 1981); i.e., the WCST-Computer Version 4 (WCST-CV4); and the Comprehensive Executive Function Inventory-Adult (CEFI-Adult; Naglieri & Goldstein, 2017) were selected. The WCST-CV4 test is organized to assess a subject's ability to switch tasks (i.e., assesses flexibility and planning) and to control or adjust to perseverative influences (i.e., assesses self-regulation). These areas align with successful clinical decision-making and professional practice in the SLP field (see Table 1.2). The WCST has been demonstrated to be a valid and reliable tool for

assessing executive dysfunction in various populations (King, Sweet, Sherer, & Vanderploeg, 2002). The WCST is most often used to assess the executive functioning in persons with identified deficits, including schizophrenia (Deicken, Merrin, Floyd, & Weiner, 1995), high-functioning autism or attention-deficit hyperactivity disorder (Tsuchiya, Oki, Yahara, & Fujieda, 2005), depression (Grego & Golden, 2015), and brain injury (Greve, Love, Sherwin, Mathias, Houston, & Brennan, 2002). In typically developing individuals, the WCST has been utilized as a means of assessing executive functioning based on age (Rodriguez-Aranda & Sundet, 2006), and gender (Boone, Ghaffarian, Lesser, Hill-Gutierrez, & Berman, 1993), and has been employed to assess genetic and environmental influences in normal adolescent twins and siblings (Chou, Kuo, Lin, & Chen, 2010).

The CEFI-Adult was selected as it serves as a subject's self-assessment of EF ability, and specifically asks for the subject to rate abilities in areas critical to the SLP profession (i.e., attention, inhibitory control, planning, emotion regulation, initiation, self-monitoring, flexibility, organization, and working memory). Both CEFI-Adult Full Scale score reliability ($\alpha = .97$) and CEFI-Adult scales median ($\alpha = .83$) are high. Validity studies have also shown the test as able to differentiate individuals with a clinical condition and those in the general population (Naglieri & Goldstein, 2017) As these two tests assess essential elements applicable to clinical practice, they were the instruments selected for use in this study.

Rationale for this Study

The current study investigated the predictors of clinical success in graduate SLP students. As SLP graduate school students require demonstration of competence, not only academically, but also clinically, in order to graduate, this study investigated the relationship between SLP graduate school academic admissions criteria, tests of EFs, and academic and clinical outcomes.

Based on the projected need for more trained SLPs in the near future, and potential increase in graduate student SLP program sizes, identifying students with the greatest potential during the graduate school admissions process is a timely and even pressing demand. Findings may assist graduate SLP programs to better screen SLP graduate student applicants.

Statement of Purpose

The purpose of this study was to extend research that examines predictors of success in graduate programs, not only for academic performance, but also for clinical abilities.

Specifically, this research investigated what relationships, if any, exist between: (a) academic admissions criteria, (b) tests of EFs, and (c) academic and (d) clinical outcomes. Therefore, this study had one hypothesis:

1. A relationship exists between EF scores, academic outcomes, and clinical performance for graduate SLP students.

Research Questions

This research aimed to explore what variables contribute to academic and clinical success in a graduate SLP program. The predictive power of these variables and clinical outcomes was also investigated. The central research question guiding this study was: What are the best admissions predictors of success in graduate SLP programs? More specifically, two research questions were targeted across six areas of analysis:

1. Of UGPA, GRE scores, EF scores (the Wisconsin Card Sort Test-Computerized Version 4 [WCST-CV4], and the Comprehensive Executive Function Inventory-Adult [CEFI-Adult] scales), what is the model of best fit to predict academic outcomes, including:
 - a. GGPA?
 - b. Praxis II scores?

2. Of UGPA, GRE scores, WCST-CV4 scores, and the CEFI-Adult scales, what is the model of best fit to predict clinical outcomes, including:
 - a. Evidence-Based Research Case Study Paper Scores (EBRCS)?
 - b. Clinic 1 Final grades?
 - c. Clinic 2 Final grades?
 - d. Clinic 3 Final grades?

CHAPTER 2

REVIEW OF THE LITERATURE

Although the number of students pursuing degrees in healthcare professions is projected to increase substantially over the next decade (BLS, 2017), predictors of clinical ability in these students are not well investigated or understood (Reed, 2007). Of the studies that do exist, there is a lack of consistency in the outcomes of research studying predictors of graduate student success. For example, investigators in two studies of SLP graduate school programs reported opposite findings regarding the utility of the GRE in predicting student success. Forrest and Naremore (1998) indicated the GRE was the less predictive measure of success while UGPA was most predictive. Other researchers (Baggs, Barnett, & McCullough, 2015), found GRE subscale scores were predictive of students' performance on the Praxis II.

This chapter will review the current research on predictive measures of academic success in graduate school for clinical professions such as SLP. The review culminates with implications for future research that investigates predictors of success in graduate SLP programs. Compared to the amount of research available on the validity of standardized testing measures in students, cognitive testing of clinical ability is limited at best. Additionally, even less is known about the predictive success of assessments of cognitive function on clinical success in graduate SLP programs.

Method

Electronic Literature Search

A review was conducted of the following databases: EBSCOhost, PsychInfo, Google Scholar, and PubMed. Search terms included; *graduate school admission OR graduate admissions AND assessment, master's degree OR master's program, alternative assessments,*

predictors, and success.” Following this initial search, the search terms “*speech language pathology OR SLP OR speech therapy*” were added. The review is based on articles published in peer-reviewed journals, written in English, and involving college (graduate and undergraduate) students. This electronic search resulted in the identification of 183 articles.

Criteria for Inclusion

From these 183 articles, publications were included if they met the following criteria: (a) published in a peer-reviewed journal, (b) included some or all the aforementioned search terms, (c) involved master’s-level programs, and (d) incorporated an experimental design. Excluded were non-empirical research studies, anecdotal papers, unpublished dissertations, articles investigating only portions of standardized tests to ensure total scores were included and reduce researcher bias, case studies, research involving doctoral-level students, surveys, studies involving students with disabilities and at-risk students, student perception assessments, letters to the editor, and/or studies that did not report or correlate graduate school success with other scores or assessments.

Review Process

The author reviewed the titles identified in the search to determine inclusion. This eliminated 40 articles, leaving 143 remaining. Next, the author read the abstract to determine whether the article met the inclusion criteria, which led to an elimination of 120 articles. Then the author read each of the remaining 23 articles to determine which of the publications met inclusion parameters. Additionally, a hand search of the reference sections of each of these articles was conducted to ensure search completeness, which resulted in the addition of two articles. In all, 25 studies met the inclusion criteria for this review, including a total of 19,626 student records. A summary of these articles is available in Appendix A.

Results

Overview of Literature Reviewed

Purpose. In general, the purpose of each of these 25 studies focused on a similar theme; predicting the success of master's-level students based on analyses of admissions data. The presence of GRE scores as significant and effective predictors of graduate school academic success was reported in one study, and this was in the field of psychology (Sharpless & Barber, 2013). GRE subtests, either individually or combined, were identified as predictors of success in seven studies. Specifically, certain GRE subtests were predictive of outcomes in the field of SLP (Baggs, et al., 2015; Boles, 2018); engineering (Howell, Sorenson, & Jones, 2014); economics (Krueger & Wu, 2000); counseling (Hatchett et al., 2017; Schmidt et al., 2011; & Smaby et al., 2005); and criminal justice (McKee, Mallory, & Campbell, 2001). Combining three GRE subscales (GRE-V, GRE-Q, GRE-A) best predicted success in criminal justice graduate students' GGPA (McKee, et al., 2001). GRE scores and UGPA were identified as predictors of graduate school success in two SLP studies (Kjelgaard & Guarino, 2012; Ryan et al., 1998) and three counseling studies (Hatchett et al., 2017; Schmidt et al., 2011; & Smaby et al., 2005). Researchers from five studies indicated that UGPA was the most predictive of graduate school success in public administration (Darolia, Potochnick, & Menifield, 2014), SLP (Forrest & Naremore, 1998; Halberstam & Redstone, 2005); nursing (Newton & Moore, 2007), and physical therapy (Thieman, Weddle, & Moore, 2003). Interestingly, although GRE scores were the least predictive measures and UGPA scores were the highest predictors of success in graduate SLP students' success in the Forrest and Naremore (1998) study, Reed (2007) found GRE-V & GRE-V+Q most significantly correlated to clinical practicum grades and also correlated to Praxis II scores.

Investigators in one study found varying levels of predictability of success in a graduate psychology program based on the group psychology students belonged; GRE scores were the strongest predictor of program completion in the professional group, but the least predictive factor in the experimental group (House & Johnson, 2002). Researchers from two studies found little to no strong correlation for the use of the GRE as a predictive measure of academic success in graduate school (Thieman, Weddle, & Moore, 2003; Wao, Ries, Flood, Lavy, & Ozbek, 2016); and one study (Troche & Towson, 2018) found that when UGPA, GRE-V, GRE-Q, GRE-W were weighted equally, none predicted graduate student academic success as (i.e., GGPA) or clinical scores (i.e., the school's clinical checkpoint and Clinical Skill Acquisition Rubric).

Further, investigators of three studies (Evans, 2017; Katz, Chow, Motzer, & Woods, 2009; Suhayda, Hicks, & Fogg, 2008) reported GRE scores as barriers to admissions applications. Lastly, the results of two studies involved alternative assessments (i.e., tacit knowledge; Edwards & Schleicher, 2004; emotional intelligence, Lewis, 2010) to predict academic success in graduate school.

Statistical analysis. Studies in this review conducted regressions of standardized scores (Boles, 2018; Darolia et al., 2014; Evans, 2017; Hatchett et al., 2017; House & Johnson, 2002; Howell et al., 2014; Krueger & Wu, 2000; Lewis, 2010; McKee et al., 2001; Reed, 2007; Ryan et al., 1998; Schmidt et al., 2011; Smaby et al., 2005; Sharpless & Barber, 2013; Thieman et al., 2003; Troche & Towson, 2018; Wao et al., 2016); correlations (Halberstam & Redstone, 2005; Katz et al., 2009; Newton & Moore, 2007), stepwise discriminant analyses (Baggs et al., 2015; Forrest & Naremore, 1998), path analyses (Kjelgaard & Guarino, 2012), chi-square analyses (Suhayda et al., 2008); and factor analyses (Edwards & Schleicher, 2004). These methods were used to analyze retrospective standardized scores and/or scores obtained from tests presented to

graduate students. Multiple regressions provide the predictive value of a variable (the dependent variable) based on the value of two or more other variables (the predictor variables).

Discriminant analysis selects one variable at a time to determine the greatest difference between groups. Path analyses extend multiple regression by describing dependencies of one variable on another. A chi-square analysis tests for significance between observed and expected frequencies of occurrence in variables. Factor analyses describe the changes in variables via unobserved elements, or factors.

Major Themes

Four major themes emerged in the review of the literature: (a) support for use of the GRE as a predictor of academic success in graduate school programs (independently, based on subsections, or in combination with other measures such as UGPA or clinical assessments); (b) negative outcomes/barriers to admissions when GRE is used; (c) use of UGPA to predict graduate school success; and (d) the use of alternative graduate school assessments to predict graduate school success. Each of these themes will be described in the sections that follow.

GRE

As previously mentioned, many graduate schools rely on the GRE as a means of selecting candidates. The exam is rigorous, standardized, can be taken at locations across the country, and has been cited frequently as an effective measure of candidate capabilities (Benham & Hawley, 2015; LeCrom, Rufer, Slavich, Dwyer, & Greenhalgh, 2016). Many studies in this review discussed the use of the GRE as a predictor for considering graduate school admissions.

Researchers compared graduate-level psychology students' GRE and GPA scores to results of the discipline's licensure exam. Much like the Praxis II examination for SLPs, passing the Examination for the Professional Practice in Psychology (EPPP) is required for licensure in

psychology. Sharpless and Barber (2013) conducted a study using a multiple correlation analysis of EPPP performance of a total of 14,372 examinees with their corresponding GRE and GPA scores. The authors found that GRE scores (along with the percentage of minorities in programs and internship match rates) consistently predicted EPPP performance.

GRE subsections. Sections of the GRE are other possible predictors of success in specific graduate study fields. In the SLP field, Boles (2018) reported the model of best fit to predict SLP graduate school success included three variables; GRE-V, GRE-Q, and the students' grade in the speech and language development course taken before graduate school admission ($p = .004$; R^2 value of .260). Baggs et al. (2015) evaluated the relationship between UGPA, grades, and GRE subtest scores with performance on the Praxis II examination in SLP, GGPA and clinical performance. The authors analyzed admissions data for 230 students from four SLP graduate school programs, assigned the students to three groups based on Praxis II scores (i.e., high performance, moderate performance, low performance/fail) and two groups based on clinical performance (those who required little supervision, and those who required high levels of supervision during their schooling). The authors reported statistically significant results between GRE-T, GRE-Q, and in-field UGPA.

Howell et al. (2014) reviewed the performance of 92 students graduating with a Master of Science (MS) degree in engineering. They found UGPA and the score on the quantitative section of the GRE were the most dominant predictors of success in the graduate mechanical engineering program. GRE in math predicted employment success (job placement) in a study of 344 economics graduate students (Krueger & Wu, 2000). The authors found that the math GRE score, economics GRE score, and admission's committee ratings were helpful in predicting job placement.

Smaby et al. (2005) investigated the predictive behaviors of admission criteria on counselor skills and personal development of 80 graduate students. The authors found that GRE-V and UGPA predicted overall scores on the Counselor Preparation Comprehensive Examination (CPCE; Center for Credentialing and Education, n.d.), though correlations were not noted on all of the CPCE subtests. Extending this study in the field of counseling were the works of Schmidt et al. (2011) and Hatchett et al. (2017). Schmidt and colleagues (2011) reported that UGPA, GRE-V, and GRE-Q predicted success on the CPCE. Likewise, Hatchett et al. (2017) reported GRE and UGPA were strong predictors of CPCE scores.

McKee et al. (2001) looked at the GRE, GGPA and UGPA scores from 94 graduates of a master's degree program in criminal justice. Their regression analysis found that UGPA and GRE scores explained nearly half of the variance in GGPA. For optimal predictive validity, the authors suggested that all three GRE subscales need to be used to inform the admissions process for criminal justice programs. House and Johnson (1993) analyzed the predictive validity of the GRE Advanced Psychology Test on the graduate school performance of 250 students in psychology programs. The authors found GRE-V as the best predictor of degree completion for students on the professional graduate track, but least predictive for students on the general/experimental psychology track.

GRE with other measures. Three studies analyzed GRE scores and other measures of SLP students to better inform admissions outcomes. A study of 84 graduate SLP National Examination in Speech Pathology and Audiology (NESPA) scores, GGPA, GRE-V, GRE-Q and GRE-V+G, overall UGPA, and GPA in the SLP major was undertaken by Ryan et al. (1998). The researchers found GRE-V+Q scores were weak predictors of NESPA scores ($r^2=.18$) and GGPA ($r^2=.10$).

The relationships between Praxis II scores, GGPA, UGPA, and GRE-V, GRE-Q, and GRE V+Q were investigated in a study of 43 SLP graduate students at historically black universities (Reed, 2007). The author found that GRE-V & GRE-V+Q most significantly correlated to clinical practicum grades and also correlated to Praxis II scores. Specifically, she significant and moderate correlations between GRE-V ($r=0.36$), GRE-V+Q ($r=0.37$) and clinical practicum grades. The author determined clinical grades and sections of the GRE should be considered during the SLP admission process, specifically for minority students.

Kjelgaard and Guarino (2012) utilized standardized scores of 122 graduate SLP majors to determine which variables (i.e., UGPA, GRE-Q, and GRE-V scores) had predictive admission value. The authors found that the linear combination of the predictor variables accounted for 36% of the variance in GGPA. Further, GRE- Q and UGPA were reported to have significant β s (i.e., 0.30 and 0.42, respectively). A second regression model indicated a coefficient of determination of .32 for Praxis II score by GGPA. Thus, GRE-Q and UGPA were both statistically significant predictors of students' academic performance, and GGPA was a strong predictor of Praxis II scores. Interestingly, although graduate UGPA and GRE scores correlated to success on the Praxis II examination, undergraduate SLP majors scores were negatively associated with GRE-Q and GRE-V, while positively associated with UGPA. The authors suggest environmental influence on graduate student outcomes should not be overlooked.

GRE as Barrier

Some researchers have called into question the effectiveness of the GRE in predicting GGPA and academic success (Liu, Kligger, Bocheneck, Holtzman, & Xu, 2016; Pachero, Noel, & Appleyard, 2015). Critics of the GRE have long claimed that utilizing the exam alone limits schools to viewing potential candidates based solely on their aggregate scores on the exam. This

approach does not account for a variety of other educational factors that might produce a more accurate depiction of the candidates' capabilities (ASHA, 2017, September 28). Others note the potential for various forms of cultural bias inherent to the GRE and other standardized tests may negatively influence results (Liu, Kligger, Bochenek, Holtzman, & Xu, 2016; Pachero, Noel & Appleyard, 2015). Specifically, some experts suggest the GRE unfairly measures individuals from diverse backgrounds due to the rigor of the GRE and the difficulty in obtaining training and education on the tests' standards during secondary education. Finally, others contend that because GRE exams are standardized across fields, the exam does not always adequately measure a candidate's capacity for adapting to discipline-specific professional pressures and expectations (Oliveres-Urueta & Williamson, 2013; Pachero et al., 2015).

Wao et al. (2016) assessed the predictive ability of GRE scores on GGPA in 329 construction management students. Results revealed weak predictive correlations which led the authors to suggest that construction management programs strongly reconsider whether to use GRE scores as part of their admission process. Evans (2017) looked at the predictive validity of UGPA and GRE scores from 533 graduates of teacher preparation programs, and only UGPA was noted to be moderately related to graduate student success. The author further stated that using GRE scores may adversely impact the graduate program by limiting the number of admitted candidates.

Research in the field of nursing has provided a substantial amount of information about standardized scores as indicators of success in the profession's graduate programs. In fact, use of the GRE to predict success in graduate school nursing students has been highly scrutinized. Katz, Chow, Motzer, and Woods (2009) found that admissions scores of the 217 students admitted into their graduate nursing program were actually a barrier to the application process, with GRE

scores explaining only 5-8% of variance in academic ability. In a study which looked at 738 master's level nursing students' GRE results, cumulative GPA (CUMGPA), and undergraduate nursing GPA (NSGGPA), any combination of the two variables was just as predictive as the three variables (i.e., GRE scores were shown to have no predictive value; Suhayda, Hicks, & Fogg, 2008). Further, as a CUMGPA of 3.25 and NSGGPA of 3.0 predicted success in graduate school, the program from which the research was conducted ultimately decided to waive the GRE requirement for applicants who met the GPA criteria and devised alternative assessments for those applicants who did not meet the GPA requirement.

Troche & Towson (2018) found that when UGPA, GRE-V, GRE-Q, GRE-W were weighted equally, none predicted graduate student academic success as (i.e., GGPA) or clinical scores (i.e., the school's clinical checkpoint and Clinical Skill Acquisition Rubric). When these factors were differentially weighted, each factor was predictive. The authors suggest considering weighing admissions criteria during the graduate SLP admissions process.

UGPA

In a study of 120 nursing students, Newton and Moore (2007) determined UGPA scores predicted verbal and quantitative scores on the GRE. The authors suggested that use of UGPA may better predict outcomes in the profession than GRE scores.

In the SLP field, Forrest and Naremore (1998) found that UGPA was the most predictive variable in graduate SLP students' success, while GRE scores were less predictive measures of graduate SLP students' success. Possibly more interesting, the authors reported the second most predictive factor in their study was students with undergraduate degrees in disciplines other than SLP demonstrated greater success in SLP graduate school programs. The authors suggested reducing the weight of GRE scores during the admissions process to better select students for

SLP graduate school programs. Halberstam and Redstone (2005) reported that GGPA correlated with speech prerequisites GPA ($r=0.76, p<0.01$), quality of the essay ($r=0.72, p<0.01$), undergraduate GPA ($r=0.56, p<0.01$), and letters of recommendation ($r=0.51, p<0.05$). Based on these results, the authors encourage consideration of UGPA in undergraduate SLP prerequisite course during the admissions process.

In the discipline of physical therapy, which is a clinical rehabilitation profession similar to the SLP profession, a study was undertaken to determine the predictive validity of admissions criteria on GGPA (Thieman, Weddle, & Moore, 2003). The authors performed a multiple regression analysis of 121 students who received their master's degree in physical therapy. Results revealed that preadmission grades were the best predictor of grades in graduate school. However, the authors noted clinical performance scores, as well as national licensure examination scores, were only moderately predicted by admissions assessments. The need to consider alternative admissions criteria for programs, such as physical therapy, was strongly recommended.

Darolia et al. (2014) sought to determine predictors of academic performance in early and mid-career professional students in a graduate public administration program. They found UGPA most strongly predicted graduate school success, with GRE scores adding predictive value to the graduate performance in the 223 student records they reviewed. However, the authors pointed out that the value of these predictors varied from early to mid-career students.

Alternative Assessments of Graduate Success

Other means of admissions assessments, such as tests of tacit knowledge (TK), emotional intelligence, and executive function (EF) have been studied in an effort to help better predict

graduate student success. However, a review of the literature located limited information specific to alternative assessments of graduate school success for this review.

Tacit knowledge. Edwards and Schleicher (2004) presented an assessment of TK to determine its validity in the graduate psychology student selection process. TK is defined as practical knowledge that is rarely verbalized, generally acquired without formal instruction, and requires judgment addressing ambiguous tasks and interpersonal challenges (Polanyi, 1996). Tests of TK present respondents with multiple written scenarios and then ask them to rate the effectiveness of various courses of action presented. Researchers found TK scores and supervisors' assessments of 70 participants were predictors of student performance. Specifically, TK was related to GRE-A score, $r = .25, p < .05$, and GRE-V scores $r = .24, p < .05$. Also, TK was significantly correlated with the School Success personality dimension $r = .34, p < .05$, and experience $r = .21, p < .05$, but unrelated to self-regulation, self-monitoring, time management, or social skills. Based on this study, the authors suggested predicting graduate psychology students' performance could be enhanced by incorporating TK into students' admissions assessments, as this measure reached beyond GRE and UGPA scores.

Emotional intelligence. Lewis (2010) examined the relationship between clinical performance and emotional intelligence in 56 graduate physical therapy students. Physical Therapy Clinical Performance Instrument (PT CPI) scores (American Physical Therapy Association, n.d.²), the Mayer-Salovey-Caruso Emotional Intelligence Test, (MSCEIT version 2.0; Mayer, Salovey, & Caruso, 2002), GRE, UGPA, and demographic information were collected. Neither total CPI score ($R^2 = 0.36, p < 0.02$) nor individual item scores, such as professional behavior ($R^2 = 0.31$), performing interventions ($R^2 = 0.35, p < 0.04$), nor performing an examination ($R^2 = 0.28$) significantly related to emotional intelligence. Further, emotional

intelligence was not significantly related to GRE scores, $r = .14$, $p = 0.31$, or pre-requisite GPA, $r = 0.10$, $p = 0.46$.

Tests of Executive Function

While discussions of EF largely center on deliberate attempts to develop and increase capacities for intellectual development, research has shown that EF stems from a positive, healthy environment, which is conducive to exploration and inquiry (Shonkoff, 2011). As will be shown, research has supported the usefulness of tests of EFs as predictive performance measures.

A preliminary review of EF research suggests the utility and efficiency of EF tests as predictors of performance related to language-learning outcomes. Kapa (2013) assessed how college-aged students' EF scores impacted their ability to learn artificial language via the Wisconsin Card Sorting Test (WCST), a test of cognitive reasoning in which participants select one of four stimulus cards to match a response card based on color, number, or shape; the Simon Task, (a task assessment which suggests that reaction times are usually faster and more accurate when the stimulus occurs in the same relative location as the response, regardless of the location's relevance to the task; Simon, 1963); and the Attention Network Test (ANT), which tests alerting (i.e., the ability to achieve and sustain optimal levels of alertness), attention and executive control (Fan, McCandliss, Sommer, Raz, & Posner, 2002). The author found EFs significantly correlated to language learning ability in all three tests (Kapa, 2013). As EFs have been identified as core components of decision-making, organizing, planning, working memory, and the ability to shift attention and self-regulate, the usefulness of assessing EFs in aspiring clinical professionals is apparent.

In a pilot study, Roitsch and Watson (2017) investigated the relationships between the GRE, UGPA, GGPA, the WCST-CV4, (Harris, 1990), and tests of phonological processing from

the Comprehensive Test of Phonological Processing -2 (CTOPP, Wagner, 1999) on Praxis II examination scores in SLP and clinical case studies exam scores. The goal of this quantitative, correlational study was to better predict successful clinical ability by examining the relationship between the various scores. The Praxis II examination in SLP and clinical case studies exam scores were the clinical outcomes, while GGPA, UGPA, GRE-V, GRE-Q, and GRE-A served as the academic factors. Nine SLP students graduating from a southeastern university's SLP program participated in this study. In analyzing the data, correlational analyses and stepwise regressions were conducted to determine the strength of the relationship between the aforementioned variables. Analysis of these scores revealed a strong, though not significant, correlation ($r = 0.585$; $p = .098$) between scores on evidence-based research case study papers and WCST-CV4 scores. No other correlations were significant. Further, as tests of EF have been implicated in various facets of intellectual ability, such as social, psychological, and behavioral domains, using the WCST-CV4 to determine success in SLP graduate programs may be relevant and appropriate based on the results of our pilot study. While the number of participants was small ($N = 9$), researchers found the strong correlation between evidence-based research case study papers and EF scores was suggestive of a relationship, indicating that this research was promising and warranted further investigation with a larger study population.

Discussion

Limitations of Existing Studies/Gaps in the Literature

This literature review has revealed gaps in the literature that require further examination. First, the studies in this review used retrospective data as predictors of success in graduate school programs. There is a need for ongoing, longitudinal studies that track students' academic abilities at different points during their college careers (i.e., at their beginning, middle, and then end of

undergraduate school, beginning of graduate school, middle of graduate school, and at the end of graduate school). Doing so could validate the accuracy of standardized scores (e.g., GRE, UGPA, GGPA) to predict success and/or rule out growth within the graduate program as a contributor to outcomes. Until then, identifying the most predictive measures for assessments of student success in graduate school remains to be identified.

In the studies in this review, attrition or failure to graduate from the graduate programs being researched was not specifically discussed. In the same vein, few studies reported the length of time required for students to complete their graduate program. Research focusing on time-to-graduate would enhance future work in predicting graduate school success upon admission.

Another gap in the literature involves the subjective nature of some of the skills assessed. Clinical ratings, teacher perceptions, and supervisor scoring provide limited quantitative data. Further, these skills in these studies are difficult to rate and difficult to replicate, as the specific assessments were not provided. Lastly, most of the studies in the review utilized statistical analyses other than stepwise regressions. Thus, the significance of outcomes based on specific schools or programs cannot be determined in the articles reviewed.

Limitations of This Review

A significant limitation of this literature review is the emphasis of this search and the inclusion criteria used to define it. Restricting information to graduate-level (master's degree) and peer-reviewed journal publications, while omitting unpublished dissertations and research involving doctoral-level students could serve as a limitation of this review. Exclusion of publications written in a language other than English, non-scholarly, and non-peer-reviewed works further constrain this synthesis. Despite these limitations, the findings from published

writings provide insight into the gaps in the literature, basically, the lack of solid knowledge related to the usefulness of current admissions criteria in graduate school programs.

Implications for Future Research

A common theme throughout most of the articles in this review was the authors' suggestions to incorporate more information about potential students than standardized scores during the graduate school admissions process. While generally effective at assessing student academic performance, the majority of authors in the studies reviewed suggest GRE and similar testing mechanisms need to be accompanied by other evaluative methods to provide a more balanced determination of, not only candidate potential, but also candidate success, particularly for clinical knowledge and skills activities. This is especially relevant in healthcare professions, such as nursing, psychology, PT, and SLP, all of which are experiencing the growing need for highly qualified graduates. Additionally, as cultural bias has been noted in GRE and other standardized assessments, moving away from these means of assessing students may increase the diversity of individuals in these healthcare professions, specifically for SLPs. Though there is a need to admit additional graduate students, market demands indicate a more pressing need is to admit candidates who possess the knowledge, skills, and dispositions to successfully complete the program and achieve competence in their designated professions. In the pilot study conducted by Roitsch and Watson (2017), the investigators found a strong, though not significant, correlation between clinical scores (i.e., on clinical case studies papers) and EF scores. Therefore, the importance of professional competencies, which include clinical decision-making and EFs, is a consideration.

To summarize, the purpose of this literature review was to identify the research that exists involving the effectiveness of admissions metrics in determining potential success in

graduate school admissions candidates. The metrics proposed for this dissertation study incorporate cognitive functioning assessments (i.e., tests of EF) to expand the picture painted for admissions committees beyond standardized testing results. It is hypothesized that EFs will have a relationship to students' clinical scores in graduate school. Further, the use of EFs has the potential to incorporate how students think and process information, both of which are crucial for clinical work in the field of SLP into admission decisions. Since previous research has not determined if relationships exist between EFs and clinical skills, this study will investigate these connections and the relationships between standardized admissions assessments in graduate SLP students as well.

CHAPTER 3

METHODOLOGY

The research methods described in this section were influenced by the aforementioned pilot study by Roitsch and Watson (2017). This chapter describes the extended, modified methodology for the dissertation research to examine the relationship between EF scores, GRE scores, UGPA, and clinical and academic outcomes of a graduate SLP program. It includes the research question, research design, description of the population studied and study variables, descriptions of how data were compiled and analyzed, as well as potential study risks and benefits.

Research Questions

This research aimed to explore what variables contribute to clinical success based on the strength of the relationship between academic scores at admission (i.e., GRE, UGPA), academic scores at program completion (i.e., GGPA, Praxis II), clinical, and EF scores. The prediction power of these variables and clinical outcomes also was investigated. The central research question guiding this study was: What are the best admissions predictors of success in graduate speech-language pathology programs? Two research questions were targeted for six analyses:

1. Of UGPA, GRE scores, EF scores (the Wisconsin Card Sort Test-Computerized Version 4 [WCST-CV4], and the Comprehensive Executive Function Inventory-Adult [CEFI] scales), what is the model of best fit to predict academic outcomes among:
 - a. GGPA?
 - b. Praxis II scores?

2. Of UGPA, GRE scores, WCST-CV4 scores, and the CEFI-Adult scales, what is the model of best fit to predict clinical outcomes among:

- a. Evidence-Based Research Case Study Papers Scores (EBRCS)?
- b. Clinic 1 Final grades?
- c. Clinic 2 Final grades?
- d. Clinic 3 Final grades?

Research Design

The current research incorporated quantitative, stepwise regression analyses to investigate the predictive value of multiple independent variables for several dependent variables measured in graduate SLP students. This dissertation research extends the aforementioned pilot study (Roitsch & Watson, 2017) and modified methods to include the addition of a self-assessment of EF and on-campus clinical grades, and the removal of the phonological processing test utilized in the pilot (as no significant relationships were identified with these scores). This dissertation research examines the relationship between clinical outcomes, academic variables, and EF test scores in graduate SLP students. The goal of this study was to better predict successful clinical ability by identifying variables with the strongest relationships among standardized scores on the GRE, undergraduate and graduate GPAs, evidence-based research case study papers, tests of executive functions, final clinic grades across three semesters of training, and Praxis II examination scores in SLP.

Study Population

The population for this study consisted of 37 students in a master's degree program in SLP at a southeastern U.S. university between 2017-2018. Participants were students who were enrolled in the graduate SLP program, had completed all of their coursework, had taken the

Praxis II examination for SLP, had submitted the graduate program's requirement cumulative end-of-program research paper, and were working toward completing their final clinical externship or their fellowship year. This population was selected because these individuals were most likely to have completed all or most of their coursework related to becoming an SLP and had taken the Praxis II examination for SLPs, making scores available for inclusion. All selected students were advised of their role in the research and its voluntary nature. Consent authorization was obtained for their participation in EF testing, access to existing academic and clinical data, and inclusion of these scores in the dissertation study. Lastly, students confirmed (and researchers documented) that they had not taken any version of the two EF tests to be used in the study prior to participating in this research. It should be noted that all students took the WCST-CV4 test, while 30/37 responded to the request to complete the CEFI-Adult test.

Data Collection

Sources of Data

To determine the relationship between scores, the academic records of 37 graduate students in a master's program in SLP who met criteria and agreed to participate in the study were collected and summarized. Data collection occurred after participants provided written informed consent to be tested and allowed the researcher to access existing admission data and academic and clinical outcomes records.

The graduate program director provided data from the students' academic records, including admissions data (i.e., UGPA and GRE scores). In addition, academic and clinical outcomes from the graduate training program were obtained. Academic outcomes were the students' GGPA's. The three clinical outcomes included: final scores on the students' clinical placement during their on-campus practicum courses, scores on the culminating written clinical

test in the graduate SLP program (i.e., the evidence-based research case studies paper or EBRCS), and Praxis II in SLP scores. These measures are described in greater detail in the Study Variables section.

In addition, tests of EF, ones that specifically address the overlap of the aforementioned EF clusters (Brown, 2005) and areas (Barkley et al., 2008); that is, working memory, self-regulation, sustaining effort, organizing, sustain and shifting attention, were administered to participants. The first test was the Wisconsin Card Sorting Test (Grant & Berg, 1948; Heaton, 1981). The research edition of the WCST was utilized for this research study (i.e., the Wisconsin Card Sorting Test Computer Version 4-Research Edition: WCST-CV4). This version of the WCST is the same in design as the original (Grant & Berg, 1948). It was the test given to students in the pilot study as well (Roitsch & Watson, 2017). As graduate students who are proficient in computer use are enrolled in this study, the WCST-CV4 was selected as it is computerized and allows for ease of use and data collection. Scores were readily available upon test completion.

The second test, the Comprehensive Executive Function Inventory-Adult (CEFI-Adult; Naglieri & Goldstein, 2017) self-assessment scales were used as a self-reporting measure of EF for this research. These two EF tests were administered in counterbalanced order. That is, every other student received the WCST-CV4 first to ensure that results of one test did not impact the other. Scores on both of these tests were compiled with information from students' academic records to complete the data sections. Information about these two EF tests follows.

Instruments

Wisconsin Card Sorting Test (WCST). The original version of the WCST was designed as a test of cognitive reasoning, initially developed at the University of Wisconsin in

1948 (Grant & Berg, 1948). Throughout the years, revisions have been made. Along with the original assessments of cognitive flexibility and abstract reasoning (Grant & Berg, 1948), the current version of the WCST is available in paper and pencil form or in computerized versions, and tests an individual's ability to strategize, organize, shift cognition based on environmental cues, manage behaviors to achieve goals, control impulses (Eling, Derckx, & Maes, 2008). When completing the test, participants must select one of four stimulus cards to match a response card based on color, number, or shape. When the participant selects 10 correct consecutive responses, the sorting rule is changed (e.g., if the rule was to sort based on color, a change is made to sorting by suit or by number without prior indication of a change). Based on the participant's selections, the WCST provides several scoring outcomes, including measures of perseveration (i.e., continuing to make the same sorting selection regardless of stimulus card change), categories correctly sorted, and number of errors. These outcomes include raw scores, age- and education-corrected standardized scores, *T* scores, percentile scores as well as normative and age-matched scores. Performance on the WCST has been suggested to indicate levels of cognitive flexibility (Levine, 2017), but also frontal lobe EF deficits (Alvarez & Emory, 2006; Demakis & Becker, 2003). For purposes of this research to assess the EF abilities of graduate SLP students, the research edition of the WCST (i.e., the WCST-CV4 research edition) was selected.

Comprehensive Executive Function Inventory Adult (CEFI Adult) Self-Assessment.

As self-report measures of EFs have been identified as determinants of academic success in college students (Baars, Bijvank, Tonnaer, & Ejolles, 2015), the CEFI Adult (Naglieri & Goldstein, 2017) was used in this dissertation. The CEFI-Adult determines EF abilities via self-report and/or observer ratings. This test is also provided via computer and can be emailed to

participants to complete. For this study, the self-report rating scale (i.e., the CEFI-Adult Self-Assessment) was utilized. Participants were asked to rate their abilities across nine different scales to determine EF strengths and weaknesses. This assessment provides a total score as well as a normed report of the following subscales: attention, inhibitory control, planning, emotion regulation, initiation, self-monitoring, flexibility, organization, and working memory. The adult version of the CEFI, which is normed for adults aged 18 years and older, is relatively new. However, the original CEFI (Naglieri & Goldstein, 2013) has been utilized in schools as a rating scale for children aged 5-18 years for several years. This assessment was selected as a means of determining the graduate SLP students' perceptions of their EF strengths and weaknesses, in turn to compare their scores on the WCST-CV4 Research edition and other academic and clinical test scores.

Study Variables

Clinical, academic, and executive function scores were utilized in this research. The clinical outcome variables are described below. It should be noted that the following clinical outcomes are specific to the SLP graduate school program from which the participants were recruited.

Evidence-based research case study papers. As the culminating written project of the SLP master's degree program, students complete two evidence-based research case studies papers (i.e., one pediatric paper and one adult-focused paper) which require a score of 80% or higher to pass. These papers are used to evaluate the students' ability to synthesize knowledge to clinical scenarios. These papers are critiqued based on medical and neurological considerations, assessment methods, tests, and anticipated results; diagnostic and prognostic conclusions, management recommendations and procedures, rationale for treatment termination, follow-up

recommendations, and additional referrals. Writing mechanics and appropriate reference/citation style are considered as well. Two examiners read each paper and reached consensus on a score, with the maximum score of 50 points per paper. Therefore, students could achieve a maximum score of 100 points on the two papers combined.

Clinical coursework. The final clinic grades (from course CSD 669) at three points in time were obtained. Final clinical grades from the participants' first, second, and third clinic sessions in which they worked as supervised student clinicians were recorded and included in the analysis. Clinical supervisors assess these clinical skills based on the department's clinical skills 0-4 scale (i.e., 0 = dependent, 1 = emerging; 2 = present; 3 = developed; and 4 = exceptional). The score is an average of ratings provided across 66 individual items that pertain to essential clinical skill competencies (e.g., professionalism, assessment and treatment skills, etc.)

Academic outcome variables are listed below:

Graduate Grade Point Average (GGPA). Graduate GPA was recorded as the cumulative GPA from the participants' masters' in SLP program and listed on a 4.0-point scale.

Praxis II score. The Praxis II exam consists of multiple choice questions assessing nine areas of graduate coursework related to knowledge and skills in speech-language pathology. There are three sections of the Praxis II exam: (a) Foundations and Professional Practice (i.e., questions about language development, communication, research, collaboration and documentation); (b) Screening, Assessment, Evaluation, and Diagnosis; and (c) Planning, Implementation, and Evaluation of Treatment. A minimum score of 162 is required to pass (ASHA, 2017; ASHA, n.d.; Educational Testing Service, ETS; 2018). The maximum score on the test is 200. A passing score is one of the requirements of the Certificate of Clinical Competence in SLP.

Academic independent variables are as follows:

Graduate Record Exam (GRE) scores. GRE scale scores were recorded for the following: GRE-Verbal, GRE-Quantitative, and GRE-Analytic ratio scores.

Undergraduate Grade Point Average (UGPA). Undergraduate GPA was recorded as the cumulative GPA from the participants' undergraduate training and listed on a 4.0-point scale. In addition, UGPA in the major courses and in science courses were extracted.

Executive functioning assessments as independent variables are listed below:

Wisconsin Card Sorting Test (WCST) score. The WCST-CV4 (Research edition) was administered by the author and the participants' total raw scores and 10 raw scores were entered. These raw scores are: trials administered, total errors, perseverative responses, perseverative errors, non-perseverative errors, conceptual level responses, categories completed, trials to complete first category, failure to maintain set, and learning to learn.

Comprehensive Executive Function Inventory Adult (CEFI Adult) score. The 80-item self-report of the CEFI Adult was recorded using a 6-point scale. Results were used to calculate a full-scale score and nine subscales scores of EFs (i.e., attention, inhibitory control, planning, emotion regulation, initiation, self-monitoring, flexibility, organization, and working memory).

Data Compilation and Analysis

To reiterate, the purpose of this study was to investigate what relationships, if any, exist between: (a) academic admissions criteria, (b) tests of EFs, and (c) academic and (d) clinical outcomes in graduate SLP students in order to better predict success in graduate school.

Data screening. To assemble the data required to assess the relationships between the independent and dependent variables, student academic records were collected directly from the

students or from their graduate program director following students' written consent and permission. The set of complete participants' data records, including standardized scores, evidence-based research case studies paper scores, and clinical grades were screened and double-checked by study investigators to ensure accurate recording.

Data collection. The second round of data collection occurred after participants were selected, consented, and their academic records were verified. Tests of EF were administered to include participants in the second round of data collection. Scores on the WCST-CV4 (Research edition) and the CEFI-Adult were compiled with information from students' academic records. Upon administration of the tests and data collection, the investigators confirmed collection and scoring accuracy. For confidentiality purposes, once scores were coalesced, names were removed, and each student was given a numeric identifier. All hard copies of data were kept in a locked file at the university with only the author and co-investigators given key access. Similarly, the electronic versions of the data were stored on a password-protected computer at the university, with only the author maintaining the password. Results were reported in aggregated format and by students' numeric identifiers. After data analysis, all identifiers were destroyed.

Statistical analyses. Following data entry and confirmation of accuracy, the analysis of data involved correlation and stepwise regression methods to determine the strength of the relationship(s) between the variables. The assumption of the regressions were tested and according to the normal distribution plot of the residuals and the results of the K-S test, normal distributions were confirmed. As nearly all (i.e., 36/37 of the participants in this study were women, and the population's characteristics (e.g., age, years of schooling, etc.) were not recorded, neither gender nor specific student characteristics were analyzed. Instead, the

descriptive statistics (i.e., group mean and score ranges) computed provide an impression of the data collected. A full model of stepwise multiple regression was employed to determine which variables had the most predictive validity. As a combination of forward selection and backward elimination methods, stepwise regression was an appropriate statistical test for this study as it determines the significance of each variable, while removing the weakest correlated variable which minimizes or eliminates multicollinearity, doing so in a stepwise fashion. Each step in this analysis provides the most significant predictor variable (i.e., which variables contribute to predicting success in SLP graduate school programs). The use of stepwise multiple regression involves the statistical program's selection of variables. To control for multicollinearity (i.e., when variables correlate to the degree that they provide duplicate information in the analysis) Variance Inflation Factor (VIF) was computed between regression variables in this study. As is common practice, if a VIF value of four or greater was produced (Hair, Black, Babin, & Anderson, 2010), that variable was removed, and the regression was repeated. This process continued until the VIFs for that model were < 4 .

Ethical Considerations

The Institutional Review Board at Old Dominion University approved this research study (see Appendix D). This approval certifies that this study; (a) met confidentiality requirements, and (b) posed no more than minimal risk of harm or threat to participants. All identifying information was removed prior to collection of the data. This study received the status of Non-Exempt following Full Board Review.

Potential study risks. The risk of this study was the release of confidential information. To reduce this risk, all tests were de-identified. Tests were coded with a number known only to the investigators.

Potential study benefits. There were no direct benefits for participating in this study. The potential benefits could have been for the graduate students who participated and learned about research, study design, and were introduced to two tests of EFs that they may be asked to use or interpret for future clients or patients whom they clinically evaluate and treat. The likely outcome of the study was to identify the best admissions predictors of graduate training outcomes for SLP graduate student academic and clinical success.

CHAPTER 4

RESULTS

The purpose of this research was to determine what variables best predict success in a graduate SLP program. This study examined the relationships between SLP graduate admissions criteria, tests of EFs, and academic and clinical outcomes following SLP graduate training. This chapter reviews the findings of stepwise multiple regressions used to determine the relationships between the independent variables (UGPA, GRE scores, and two tests of EFs) and the dependent variables (GGPA scores, Praxis II in SLP scores, final clinical practicum scores, and evidence-based research case studies paper scores).

In total, 37 students graduating with their master's degree in SLP participated in this study. All students took the WCST-CV4 (Research edition), and 30 students replied to requests to take the CEFI-Adult assessment, which may impact outcomes. Further, two other students did not complete the SLP program, thus they did not complete an evidence-based research case study paper, nor did they take the Praxis II exam in SLP, which may also impact outcomes.

Data collected were the independent variables (i.e., students' UGPA, GRE-V, GRE-A, GRE-Q, and two tests of EF (i.e., WCST-CV4 scores, and the CEFI-Adult scales), and the dependent variables (i.e., GGPA scores, Praxis II in SLP scores, final clinical grades, and evidence-based research case studies papers). Data analysis for this study, correlations, descriptive statistics, and stepwise regressions were performed to determine what relationships existed between the independent and dependent variables to answer the study's two research questions.

Descriptive Statistics of Dependent Variables - Academic and Clinic

Descriptive statistics of the dependent academic variables of GPAs, Praxis II in SLP scores, and the dependent clinical variables of evidence-based research case study papers (EBRCSs), and final clinic grades (Clinic 1, Clinic 2, Clinic 3), are reported in Table 4.1. Scores on the Praxis II exam ranged from 164-187 ($M = 176.60$; $SD = 7.60$) on the test's 200-point scale. Scores on the EBRCSs ranged from 68-99 ($M = 86.87$; $SD = 6.66$) on the paper's 100-point scale. Clinic 1 scores ranged from 1.90-3.91 ($M = 2.65$; $SD = .585$); Clinic 2 scores ranged from 1.69-3.76 ($M = 2.78$; $SD = .570$), and Clinic 3 scores ranged from 2.33-3.91 ($M = 3.91$; $SD = .467$) on the 4-point rating scale.

Descriptive Statistics of Independent Variables

Regarding the independent variables of UGPA, GRE scores, WCST-CV4 scores, and complete data were retrieved for all study participants ($N = 37$). For the CEFI-Adult scales, 30/37 participants scores were provided. All scores are reported in Table 4.1. The study population presented with a UGPA range of 2.60-3.99 ($M = 3.50$; $SD = .33$) on a 4.0 scale. GRE-V scores ranged from 146-165 ($M = 152.32$; $SD = 4.34$) and GRE-Q scores ranged from 142-162 ($M = 148.41$; $SD = 4.17$) on the test's 130-170-point scale for these sections. GRE-A scores ranged from 4.0-5.0 ($M = 4.20$; $SD = .322$) on the test's 0-6-point scale.

For the WCST-CV4, for which $n = 37$ (i.e., all participants enrolled in this study completed the test), the total trials administered ranged from 70-128 ($M = 87.51$; $SD = 19.34$). Total Correct scale scores ranged from 8-102 ($M = 67.11$; $SD = 12.70$), and Total Errors scores ranged from 1-65 ($M = 18$; $SD = 14.35$). Perseverative Responses scores ranged from 4-30 ($M = 8.95$; $SD = 6.14$), and Perseverative Errors scores ranged from 4-25 ($M = 8.41$; $SD = 5.12$). Nonperseverative Error scores ranged from 2-44 ($M = 9.84$; $SD = 9.48$), and Conceptual Level

Responses scores ranged from 43-96 ($M=64.62$; $SD = 8.39$). Categories Completed scores ranged from 1-6 ($M=5.70$; $SD = .939$), and Trials to Complete 1st Category scores ranged from 10-120 ($M=16.59$; $SD = 19.28$). Failure to Maintain Set scores ranged from 0-3 ($M=.38$; $SD = .86$), and the Learning to Learning scores ranged from -12.42-5.98 ($M = -.823$; $SD = 3.04$). (It should be noted that the Learning to Learn scores can have a negative range as this score provides information about the participant's learning index.)

For the CEFI-Adult scales (for which $n=30$), the full-scale scores ranged from 82-123 ($M = 103.87$; $SD = 12.12$). The Attention Scale scores ranged from 76-120 ($M=98.73$; $SD = 12.42$), and Emotion Regulation Scale scores ranged from 84-127 ($M=102.97$; $SD=11.04$). Flexibility Scale scores ranged from 82-127 ($M=108.80$; $SD=10.80$), and Inhibitory Control Scale scores ranged from 80-127 ($M=104.53$; $SD=11.79$). Initiation Scale scores ranged from 67-122 ($M=100.63$; $SD=13.96$), and Planning Scale scores ranged from 73-129 ($M=100.37$; $SD=13.50$). Self-Monitoring Scale scores ranged from 84-126 ($M=105.80$; $SD=12.33$) and Working Memory Scale scores ranged from 69-124 ($M=104.17$; $SD=12.65$). These descriptive statistics represent a range of findings that allow for the proper analysis of data using the regression analyses. As previously mentioned, there were seven missing data points for the CEFI Adult scores ($n = 30$); and two missing data points for the two students who did not graduate from the clinic program (i.e., Praxis II and EBRCS scores; $n = 35$), which may impact outcomes.

Table 4.1

Descriptive Statistics for All Variables

Variable	<i>n</i>	<i>M</i>	Minimum	Maximum	Standard Deviation	Missing data
UGPA	37	3.50	2.60	3.99	.33	-
GGPA	37	3.74	3.25	4.0	.19	-
GRE-V	37	152.32	146	165	4.34	-
GRE-A	37	4.20	4.0	5.0	.322	-
GRE-Q	35	148.41	142	162	4.17	-
Praxis II	35	176.60	164	187	7.60	2
EBRCS	37	86.87	68	99.0	6.66	2
Clinic 1	37	2.65	1.90	3.80	.585	-
Clinic 2	37	2.78	1.69	3.76	.570	-
Clinic 3	37	3.19	2.33	3.91	.467	-
WCST-CV4 Trials Administered	37	87.51	70	128	19.34	-
WCST-CV4 Total Correct	37	67.11	8	102	12.70	-
WCST-CV4 Total Errors	37	18.00	1	65	14.35	-
WCST-CV4 Perseverative Responses	37	8.95	4	30	6.14	-

WCST-CV4 Perseverative Errors	37	8.41	4	25	5.12	-
WCST-CV4 Nonperseverative Errors	37	9.84	2	44	9.48	-
WCST-CV4 Conceptual Level Resp.	37	64.62	43	96	8.39	-
WCST-CV4 Categories Completed	37	5.70	1	6	.94	-
WCST-CV4 Trials Complete 1 st Cat.	37	16.59	10	120	19.28	-
WCST-CV4 Failure to Maintain Set	30	.38	0	3	.86	-
WCST-CV4 Learning to Learn	30	-.823	-12.42	5.98	3.04	-
CEFI-Adult Full-Scale Score	30	103.87	82	123	12.12	7
CEFI Attention Scale	30	98.73	76	120	12.24	7
CEFI Emotion Regulation Scale	30	102.97	84	127	11.04	7
CEFI Flexibility Scale	30	108.80	82	127	10.80	7
CEFI Inhibitory Control Scale	30	104.53	80	127	11.79	7
CEFI Initiation Scale	30	104.50	67	122	13.80	7
CEFI Organization Scale	30	100.63	73	121	13.96	7
CEFI Planning Scale	30	100.37	73	129	13.50	7
CEFI Self-Monitoring Scale	30	105.80	84	126	12.33	7
CEFI Working Memory Scale	30	104.17	69	124	12.65	7

Research Question Results

In what follows, stepwise regression results for each of the dependent variables are provided in Tables 4.2 – 4.7. Results of the research questions are listed and discussed as well.

Research Question 1a. Of UGPA, GRE scores, the WCST-CV4 scores, and the CEFI-Adult scales, what is the model of best fit to predict GGPA?

Stepwise multiple regression analysis was used to determine the model of best fit for predicting GGPA scores based on the independent variables. From Table 4.2, the resulting model of best fit included WCST-CV4 Failure to Maintain Set score, CEFI-Adult Organization scale, and CEFI-Adult Inhibitory Control scale ($\Delta R^2 = .384, F(3, 29) = 7.016, p = .001$). The three predictors in the model explained 38.4% of the variance for the model. From Table 4.3, the summary for model of best fit is given with coefficients and *p*-values. CEFI-Adult Full-Scale score variable was removed as it presented with a VIF > 4. After this variable was removed and the model was run again, the predictor variables remained constant.

Table 4.2

Stepwise Regression Results for Dependent Variable GGPA

Model	Predictor	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i> - Value	<i>p</i> -value
1	WCST-CV4 Failure to Maintain Set	.411	.169	.139	5.695	.024
2	WCST-CV4 Failure to Maintain Set, CEFI-Adult Organization	.550	.302	.250	5.844	.008
3	WCST-CV4 Failure to Maintain Set, CEFI-Adult	.669	.447	.384	7.016	.001

Organization,
CEFI-Adult
Inhibitory
Control

Table 4.3

Model of Best Fit for Dependent Variable GGPA

Model	Predictor	β	SE	t	<i>p</i> -value
	(Constant)	3.704	.257	14.412	.000
3	WCST-CV4 Failure to Maintain Set	-.115	.034	-3.424	.002
	CEFI-Adult Organization	.010	.003	3.618	.001
	CEFI-Adult Inhibitory Control	.009	.003	-2.614	.015

Research Question 1b. Of UGPA, GRE scores, the WCST-CV4 scores, and the CEFI-Adult scales, what is the model of best fit to predict Praxis II scores?

Stepwise multiple regression analysis was used to determine the model of best fit for predicting Praxis II scores based on the independent variables. From Table 4.4, the resulting model of best fit included the CEFI-Adult Initiation scale, ($\Delta R^2 = .155$, $F(1, 27) = 5.968$, $p = .02$). The lone predictor in the model explained 15.5% of the variance for the model. From Table 4.5, the summary for model of best fit is given with coefficients and *p*-values. None of the variables was removed as none presented with a VIF > 4.

Table 4.4

Stepwise Regression Results for Dependent Variable Praxis II

Model	Predictor	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i> - Value	<i>p</i> -value
1	CEFI-Adult Initiation	.432	.187	.155	5.968	.022

Table 4.5

Model of Best Fit for Dependent Variable Praxis II

Model	Predictor	β	SE	<i>t</i>	<i>p</i> -value
	(Constant)	151.739	10.262	14.787	.000
1	CEFI-Adult Initiation	.238	.097	2.443	.022

Research Question 2a. Of UGPA, GRE scores, WCST-CV4 scores, and the CEFI-Adult scales, what is the model of best fit to predict evidence-based research case study papers scores (EBRCSs)?

Stepwise multiple regression analysis was used to determine the model of best fit for EBRCSs based on the independent variables. From Table 4.6, the resulting model of best fit included WCST-CV4 Total Correct score, WCST-CV4 Trials Administered score, CEFI-Adult Planning scale, and WCST-CV4 Perseverative Errors score ($\Delta R^2 = .523$, $F(4, 27) = 8.391$, $p = .000$). The four predictors in the model explained 52.3% of the variance for the model. From Table 4.7, the summary for model of best fit for EBRCSs is given with coefficients and *p*-values. WCST-CV4 Total Errors score, WCST-CV4 Nonperseverative Responses, and WCST-CV4 Perseverative Responses score variables were removed in that order as each had a VIF > 4. The

predictor variables did not change after these variables were removed and the model was repeated for these three additional iterations.

Table 4.6

Stepwise Regression Results for Dependent Variable EBRCSs

Model	Predictor	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i> - Value	<i>p</i> -value
1	WCST-CV4 Total Correct	.472	.223	.193	7.449	.011
2	WCST-CV4 Total Correct WCST-CV4 Trials Administered	.604	.365	.314	7.190	.003
3	WCST-CV4 Total Correct WCST-CV4 Trials Administered CEFI-Adult Planning	.696	.484	.420	7.509	.001
4	WCST-CV4 Total Correct WCST-CV4 Trials Administered CEFI-Adult Planning WCST-CV4 Perseverative Errors	.770	.593	.523	8.391	.000

Table 4.7

Model of Best Fit for Dependent Variable EBRCs

Model	Predictor	β	SE	t	p-value
	(Constant)	68.905	9.566	7.203	.000
	WCST-CV4 Total Correct	.355	.074	4.813	.000
4	WCST-CV4 Trials Administered	-.372	.103	-3.622	.001
	CEFI-Adult Planning	.187	.067	2.810	.010
	WCST-CV4 Perseverative Errors	-.942	.379	2.486	.021

Research Question 2b. Of UGPA, GRE scores, WCST-CV4 scores, and the CEFI-Adult scales, what is the model of best fit to predict Clinic 1 Final grades?

Stepwise multiple regression analysis was used to determine the model of best fit for Clinic 1 Final grades based on the independent variables. From Table 4.8, the resulting model of best fit included GRE-V, and WCST-CV4 Perseverative Responses score ($\Delta R^2 = .307$, $F(2, 29) = 5.979$, $p = .007$). The two predictors in the model explained 30.7% of the variance for the model. From Table 4.9, the summary for model of best fit for EBRCs is given with coefficients and p-values. WCST-CV4 Total Errors score, WCST-CV4 Perseverative Error score variables were removed in that order as each had a VIF > 4. The predictor variables did not change after this variable was removed and the model was repeated for these three additional iterations.

Table 4.8

Stepwise Regression Results for Dependent Variable Clinic 1 Final

Model	Predictor	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i> - Value	<i>p</i> -value
1	GRE-V	.380	.144	.144	4.718	.038
2	GRE-V WCST-CV4 Perseverative Responses	.554	.307	.256	5.979	.007

Table 4.9

Model of Best Fit for Dependent Variable Clinic 1 Final

Model	Predictor	β	SE	t	<i>p</i> -value
	(Constant)	12.410	3.380	3.671	.001
	GRE-V	-.062	.022	-2.810	.009
2	GRE-V WCST-CV4 Perseverative Responses	-.039	.016	-2.518	.018

Research Question 2c. Of UGPA, GRE scores, WCST-CV4 scores, and the CEFI-Adult scales, what is the model of best fit to predict Clinic 2 Final grades?

Stepwise multiple regression analysis was used to determine the model of best fit for predicting Clinic 2 final grades based on the independent variables. From Table 4.10, the resulting model of best fit included the WCST-CV4 Learning to Learn score, ($\Delta R^2 = .134$, $F(1, 29) = 4.347$, $p = .046$). The lone predictor in the model explained 13.4% of the variance for the

model. From Table 4.11, the summary for model of best fit is given with coefficients and *p*-values. None of the variables was removed as none presented with a VIF > 4.

Table 4.10

Stepwise Regression Results for Dependent Variable Clinic 2 Final

Model	Predictor	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i> - Value	<i>p</i> -value
1	WCST-CV4 Learning to Learn	.367	.134	.134	4.347	.046

Table 4.11

Model of Best Fit for Dependent Variable Clinic 2 Final

Model	Predictor	β	SE	t	<i>p</i> -value
	(Constant)	2.828	.102	27.680	.000
1	WCST-CV4 Learning to Learn	.069	.033	2.085	.046

Research Question 2d. Of UGPA, GRE scores, WCST-CV4 scores, and the CEFI-Adult scales, what is the model of best fit to predict Clinic 3 Final grades?

Stepwise multiple regression analysis was used to determine the model of best fit for Clinic 3 Final grades based on the independent variables. From Table 4.12, the resulting model of best fit included the CEFI-Adult Emotion Regulation scale, CEFI-Adult Organization scale, and the WCST-CV4 Perseverative Errors score ($\Delta R^2 = .340$, $F(3, 29) = 5.970$, $p = .003$). The three predictors in the model explained 34.0% of the variance for the model. From Table 4.13, the summary for model of best fit for Clinic 3 grades is given with coefficients and *p*-values. WCST-CV4 Perseverative Responses score, WCST-CV4 Total Errors score, WCST-CV4

Nonperseverative Error score, and CEFI-Adult Full Scale score variables were removed in that order as each had a VIF > 4. The predictor variables did not change after this variable was removed and the model was repeated for these three additional iterations.

Table 4.12

Stepwise Regression Results for Dependent Variable Clinic 3 Final

Model	Predictor	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i> - Value	<i>p</i> -value
1	CEFI-Adult Emotional Regulation	.409	.167	.137	5.611	.025
2	CEFI-Adult Emotional Regulation CEFI-Adult Organization	.551	.304	.252	5.890	.008
3	CEFI-Adult Emotional Regulation CEFI-Adult Organization WCST-CV4 Perseverative Errors	.639	.408	.340	5.970	.003

Table 4.13

Model of Best Fit for Dependent Variable Clinic 3 Final

Model	Predictor	β	SE	t	<i>p</i> -value
	(Constant)	5.023	.707	7.107	.000
	CEFI-Adult Emotional Regulation	-.031	.008	-3.865	.001
3	CEFI-Adult Organization	.016	.006	2.516	.018
	WCST-CV4 Perseverative Errors	-.030	.014	-2.318	.042

CHAPTER 5

DISCUSSION

This chapter provides a summary of the study, discusses the results and outlines implications of the research findings. The importance of this research for current admissions practices is discussed as are suggestions for future research. Limitations of this study are identified and discussed as well.

Study Summary

The purpose of this research was to examine the possible relationships among academic, clinical, and executive function (EF) variables in graduate SLP students in order to better predict success in graduate school. Using stepwise multiple regression analyses, the researcher sought to answer the research questions that drove this study. Specifically, the following two research questions were targeted across six areas of analysis:

1. Of UGPA, GRE scores, the Wisconsin Card Sort Test-Computerized Version 4 (WCST-CV4), and the Comprehensive Executive Function Inventory-Adult (CEFI-Adult) scales, what is the model of best fit to predict academic outcomes including:
 - a. GGPA?
 - b. Praxis II scores?
2. Of UGPA, GRE scores, WCST-CV4 scores, and the CEFI-Adult scales, what is the model of best fit to predict clinical outcomes, including:
 - a. Evidence-Based Research Case Study Papers Scores (EBRCS)?
 - b. Clinic 1 Final grades?
 - c. Clinic 2 Final grades?
 - d. Clinic 3 Final grades?

It was hypothesized that a relationship would exist between EF scores, academic outcomes, and clinical performance in graduate SLP students. This hypothesis was confirmed in this study. Not only did relationships exist between EF scores and the academic and clinical outcomes in this study, each of the dependent variables (i.e., GGPA scores, Praxis II in SLP scores, final clinical placement scores, and evidence-based research case studies papers) included either the WCST-CV4 or the CEFI-Adult in the model of best fit for that variable.

This study is an extension of prior research that has suggested that current standard admission criteria that rely heavily on GRE scores may not be the best predictors of success in clinical graduate school programs such as SLP (Forrest & Naremore, 1998). It also expands research that suggests alternative measures of cognitive ability may be more valid predictors of graduate student success (Edwards & Schleicher, 2004; Lewis, 2010; Wao, Ries, Flood, Lavy, & Ozbek, 2016). Lastly, this research supports the research of clinical professions that report clinical performance in graduate students is not always reflected in admissions criteria (Lewis, 2010; Thieman, Weddle, & Moore, 2003). Specifically in the field of SLP, where outcomes have been varied in relation to the effectiveness of present admissions criteria (Baggs, Barnett & McCullough, 2015; Boles, 2018; Forrest & Naremore, 1998; Halberstam & Redstone, 2005; Kjølgaard & Guarino, 2012; Reed, 2007; Ryan, Morgan, & Wacker-Mundy, 1998; Troche & Towson, 2018) the results of this study provide an alternative means of assessing and predicting success in potential students for SLP graduate schools.

Research Question 1: Academic Outcomes Results

Research Question 1a. The model of best fit for predicting GGPA in graduate SLP students included three EF tests: WCST-CV4 Failure to Maintain Set, CEFI-Adult Organization, and CEFI-Adult Inhibitory Control. As GGPA is an academic outcome, these specific tests

provide information that is useful for graduate school programs. As the predictor variable WCST-CV4 Failure to Maintain Set has been named as an assessment of cognitive flexibility (Grant & Berg, 1948) as well as distractibility (Figueroa & Youmans, 2013), the negative relationship between this score and GGPA suggests attention to task as well as the ability to maintain focus serve the aspiring SLP graduate student well for successful academic performance. Similarly, the CEFI-Adult's Organization and Inhibitory Control domains identify the characteristics of successful graduate students who need to be organized as well as well as able to control their impulses in order to complete the program's demanding academic coursework and clinical requirements.

Research Question 1b. The model of best fit for predicting Praxis II scores in SLP was the CEFI-Adult Initiation scale. As this scale requires the self-assessment of a person's ability to initiate tasks, it is interesting to note it was the lone predictor in the model for predicting Praxis II scores. The Praxis II examination, an academic assessment with clinical implications, requires the test-taker to utilize their broad academic background and clinical experiences to answer questions posed regarding hypothetical clinical outcomes. Preparation for the Praxis II requires students to study all areas of knowledge and skills, requiring strong initiation to get through the wealth of information. Thus, the ability of the SLP to initiate, or step forward and select the test answers via critical thinking across that broad domain of knowledge may explain the relationship between Praxis II test scores and the Initiation scale of the CEFI-Adult in this study.

Research Question 2: Clinical Outcomes Results

Research Question 2a. The model of best fit for predicting EBSCRs included the predictor variables of WCST-CV4 Total Correct, WCST-CV4 Trials Administered, CEFI-Adult Planning, and WCST-CV4 Perseverative Errors. One aspect of the EBSCRs requires students to

select the appropriate diagnostic tools, make decisions about medical and neurological considerations for a clinical scenario, and propose diagnostic and prognostic conclusions given hypothetical patient information. Thus, it stands to reason that the students who were able to correctly identify the patterns in the WCST-CV4 to achieve higher Total Correct score and Trials Administered scores (i.e., fewer trials administered suggests greater efficiency, understanding and completion of the task) would perform better on their EBSCR where students must recognize the patterns laid out in the case description. Similarly, the EBSCRs require students to suggest management treatment plans and procedures based on the presented hypothetical clinical scenarios. Therefore, it is understandable that the CEFI-Adult Planning scale scores in this study served as predictors for success in the model of best fit for the EBSCR variable. Lastly, as the patient scenarios presented in the EBSCRs require students to provide a rationale for treatment termination, follow-up recommendations, and additional referrals, this is a test of their ability to incorporate alternative options as needed when working with patients to provide the best optimal care from many possibilities. The WCST-CV4 Perseveration Errors score was also a variable in the model of best fit for the EBSCRs in which a negative relationship was identified. From this, it can be deduced that students who do not persevere, that is, do the same thing repeatedly without adjusting practice based on new information to improve results, may help predict the EBSCR scores in this study. Essentially, a better Perseverative Errors score suggests the individual has a greater potential to demonstrate mental flexibility and insight when given situation scenarios are presented.

Research Question 2b. The model of best fit for the Clinic 1 Final dependent variable included the GRE-V and WCST-CV4 Perseverative Responses. The clinical assessment of students in this study during their first clinical experience requires very structured and supervised

clinic experience and is heavily writing-based. Therefore, it can be deduced that how students perform on the verbal section of the GRE and their Perseverative Responses scores may predict how they perform during their first clinical experience. It is possible that those who retain and provide more objective and book-specific responses to assessment and treatment planning (i.e., those who use more rote and less subjective assessment and treatment means during their first clinical experience), and those who have the ability to adapt as needed to improve clinical performance (i.e., the negative relationship between Clinic 1 Final scores and Perseverative Responses), are more likely to be successful in their first clinical experiences, specifically regarding GRE-V scores.

Research Question 2c. The model of best fit for the Clinic 2 Final grade included the WCST-CV4 Learning to Learn score. At the end of their second clinical placement, students often are required to demonstrate more independence with their assessment and treatment planning. Therefore, the Learning to Learn score on the WCST-CV4 (i.e., the ability to learn from past experience and use it forward) as the predictor variable for their Clinic 2 Final score makes good sense. This low, positive value suggests students who could learn the WCST-CV4 tasks presented may perform better in their Clinic 2 placements.

Research Question 2d. The model of best fit for the Clinic 3 grade dependent variable included the CEFI-Adult Emotional Regulation scale, the CEFI-Adult Organization scale, and the WCST-CV4 Perseverative Errors score. At the end of their third clinical placement, students often are required to work with minimum supervision, with a diverse array of clients, and devise their own diagnostic and treatment plans. Their ability to organize and regulate their emotions are imperative skills for advanced clinical practice, thus not surprisingly these are predictors in the model of best fit for Clinic 3 Final grade scores. As previously noted, a student's level of

cognitive flexibility (i.e., a lack of perseveration) may be a predictor of outcomes for students in this stage of their graduate student clinical experience who must adapt clinical options as needed within client sessions. These results suggest that less the individual perseverates, the better they may perform clinically.

Summary

This study examined the role of EFs in predicting outcomes in graduate training programs for SLPs. Upon examination of two models of best fit for identifying academic and four models of best fit for identifying clinical outcomes in a graduate SLP program, measures of EFs, whether objective (like the WCST-CV4) or subjective (as the CEFI-Adult), were the strongest variables for predicting success. GRE-V scores were predictive in only one model and other GRE scores and UGPA were not predictive in any of the models tested. These findings suggest EFs (e.g., inhibition, working memory, and cognitive flexibility) may be important components of SLP clinical skills.

Conclusions

Implications. As the SLP field is burgeoning, and many graduate SLP programs are considering admitting more graduate students to fill the projected gap in the industry, it is essential to identify the strongest students who will be successful not only in the academic demands of graduate studies, but also in the clinical components of training. The current research provides a practical means of assessing an aspiring SLP graduate student's academic and clinical potential and may help predict successful future clinicians in the classroom and in the profession. This study suggests that tests of EF may be useful tools to guide the admissions process to increase the appropriate identification of SLP graduate students who will successfully complete the rigorous academic and clinical demands of a program. Based on this study, the use of current

academic predictors may be enhanced by incorporating tests of EFs to help predict clinical ability in aspiring SLP graduate students.

Historically, the studies of predictors of success in graduate SLP programs have provided mixed results. Further, most studies have primarily examined academic predictors, with few examining cognitive skills and none has examined the role of EFs. The results of this current research was unique in that it incorporated the use of EFs to predict both clinical and academic ability.

The authors of four SLP studies located for the review of the literature for this research study reported the GRE as a strong predictor of success on the Praxis II. Four other studies indicated that the GRE was not a strong predictor of graduate school success in SLP students. All studies caution the use of standardized tests alone when considering admission candidates, and most studies suggest programs incorporate a more inclusive approach to assessing students before admitting them into graduate SLP programs.

EFs scales and scores in this research have been shown to be predictive of academic and clinical graduate student outcomes, providing unique results across different outcomes. For example, regarding clinical outcomes, the Clinic 3 Final score model of best fit included a positive relationship with the CELF-Adult Organization scale, and negative associations with the CEFI-Adult Emotional Regulation and the WCST-CV4 Perseverative Errors score.

Understanding that organization and a lack of perseveration may be achieved by students at the end of their clinical placement is important. But equally important, if not even more important, is recognizing that students at this stage in their clinical abilities may not feel as able to regulate emotions, and thus may need more support and encouragement. Academically, the ability of a student to initiate or self-start is related to success on the Praxis II examination based on this

study. Understanding this, graduate programs could use this information throughout an admitted student's time in the graduate SLP program to guide and provide support in areas of potential difficulty.

Lastly, this research may have implications for valuable insights in the admission processes of other academic programs for clinical professions. As noted in the review of empirical research, fields outside of the SLP profession that look to assess clinical potential are many and varied (i.e., counseling, education, physical and occupational therapy, psychology, and nursing; see Appendix A). Therefore, the results of this research may also provide insight for admissions committees in other clinical graduate programs as well.

Recommendations for further research. Looking ahead, replicating the research in this study would provide information regarding the strength of the results and generalization of these findings. A larger population from varied SLP graduate school programs could be used to determine whether similar predictive models would be revealed. Larger sample sizes would allow for more rigorous methodology. Investigation into other ways of testing EFs (i.e., other tests of EF) is also recommended in future work.

Capturing students immediately upon admission into a graduate SLP program would provide the benefit of a longitudinal look at how EF tests might predict a student's progress over the course of their graduate school career. Likewise, testing an SLP student's EFs prior to beginning a graduate school program would inform baseline EF strengths and weaknesses.

As EF scores were the common predictive variables threaded throughout this research, future research could also look at whether EFs can be altered over time. For example, it would be helpful to study if specific EF exercises could be provided to enhance clinical outcomes. It would also be beneficial to investigate changes in EFs that might occur over the course of

clinical training. Lastly, assessing the undergraduate program requirements from various undergraduate institutions may provide valuable information based on the curriculum focus of that school.

Limitations

This study was conducted at one university, in one graduate SLP program with a fairly small sample size. Findings might differ with a larger sample. Likewise, as this research involved one SLP program within one university, the generalizability of these results to other universities is guarded.

Further, the instruments selected for this study (i.e., the WCST-CV4 and the CEFI-Adult) were chosen based on the practical application for the areas they presumably test. However, other tests of EF exist and if they had been used, other models might have been represented in the data. This might be considered to provide more insight into predictive variables in the future, especially because the WCST is a measure that typically can be administered only one time in clinical practice in healthy individuals. The use of a non-standardized dependent variables (i.e., the EBSCRs and the Clinic 1, 2, and 3 final) is another limitation of this study. However, confidence in those data is increased because of the careful processes used to score case studies by two examiners and the efforts to objectify clinical grades. Likewise, these variables are unique to the graduate school program involved in this study, making replication outside of this setting challenging. Also, as EFs were tested at the end of the student's graduate program and not the beginning, it is possible that some aspects of EFs may have changed with the experience. That possibility will be examined in future research.

Conclusion

This study contributes to the limited research on predictors of success, clinically and academically, in graduate SLP applicants. Results of this study suggest that the use of tests of EF could be considered in the graduate admissions process when seeking to predict success in SLP graduate school programs. Table 5.1 summarizes the predictor variables identified along with their corresponding independent variables. What is clear in examining these findings is that the current standards for determining acceptance into many graduate school SLP programs, that is, the GRE and UGPA, are much less impactful as predictors than certain EF scores. Additional research is needed to determine which tests of EF provide the best predictive models, and whether the current outcomes of this study can be replicated to strengthen these results. Despite the limits of this study, this research suggests that SLP graduate schools could benefit from employing EF assessments in their admissions processes. Ultimately, results of this research may lead programs to better identify, train, and support future SLP graduate students, clinicians, and professionals.

Table 5.1 Significant Variables

Predictor Variable	Outcome Variables					
	Academic Outcomes			Clinical Outcomes		
	GGPA	Praxis II in SLP	EBRCS scores	Clinic 1 Final	Clinic 2 Final	Clinic 3 Final
UGPA						
GRE-V				X		
GRE-A						
GRE-Q						
WCST-CV4 Trials Admin.			X			
Total Correct			X			
Total Errors						
Perseverative Responses				X		
Perseverative Errors			X			
Non-perseverative Errors						
Conceptual Level Responses						
Categories Completed						
Trials Complete 1 st Category						
Failure to Maintain Set	X					
Learning to Learn					X	
CEFI Full Scale Score						
Attention						
Emotional Regulation						X
Flexibility						
Inhibitory Control	X					
Initiation		X				
Organization	X					X
Planning			X			
Self-Monitoring						
Working Memory						

References

- Alduncin, N., Huffman, L., Feldman, H., & Loe, I. (2014). Executive function is associated with social competence in preschool-aged children born preterm or full term. *Early Human Development, 90*(6), 299-306. doi:10.1016/j.earlhumdev.2014.02.011
- Alvarez, J., & Emory, A. (2006). Executive function and the frontal lobes: A meta-analytic review. *Neuropsychology Review, 16*(1), 17-42. doi:10.1007/s11065-006-9002-x
- American Physical Therapy Association (n.d.¹) Consensus Statement on Clinical Judgment in Health Care Settings. AOTA, APTA, ASHA. Retrieved from <https://integrity.apta.org/ConsensusStatement/>.
- American Physical Therapy Association (n.d.²). Physical Therapist Clinical Performance Instrument (PT CPI). Retrieved from <http://www.apta.org/PTCPI/>
- American Psychological Association PsycNET (2017). Executive functions. Retrieved from <http://psycnet.apa.org/search/results?id=dc35391f-c07c-d2f2-1cdd-0aa16751e735>
- American Speech-Language-Hearing Association. (2017). National summary report: Descriptive statistics of PRAXIS examination scores for the speech-language pathology specialty test for test administration years 2006-2007 through 2016-2017. Retrieved from <https://www.asha.org/uploadedFiles/Praxis-Highest-Score-SLP.pdf>
- American Speech-Language-Hearing Association. (2017, September 28). Benefits and feasibility of holistic admissions in communication sciences and disorders (CSD) programs. [Web chat]. Retrieved from <http://www.asha.org/Events/live/09-28-2017-Admissions-CSD-Programs/>
- American Speech-Language-Hearing Association. (n.d). Praxis scores and score reports. Retrieved from https://www.asha.org/certification/praxis/praxis_scores/

- Ardila, A., Pineda, D., & Rosselli, M. (2000). Correlation between intelligence test scores and executive function measures. *Archives of Clinical Neuropsychology*, *15*(1), 31-36.
Retrieved from <https://doi-org.proxy.lib.odu.edu/10.1093/arclin/15.1.31>
- ASHA Leader (2018, April). Speech-Language Pathology ranks as high-growth career. *The ASHA Leader*. Retrieved from <https://leader.pubs.asha.org/issue.aspx>
- Baars, M.A.E., Bijvank, M. E., Tonnaer, G. H., & Ejolles, J. (2015, August 5). Self-report measures of executive functioning are a determinant of academic performance in first-year students at a university of applied sciences. *Frontiers in Psychology*, (6).
<https://doi.org/10.3389/fpsyg.2015.01131>
- Baggs, T., Barnett, D., & McCullough, K. (2015). The value of traditional cognitive variables for predicting performance in graduate speech-language pathology programs. *Journal of Allied Health*, *44*(1), 10-16. Retrieved from
<http://proxy.lib.odu.edu/login?url=https://search-proquest-com.proxy.lib.odu.edu/docview/1671202912?accountid=12967>
- Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin*, *121*, 65–94. Retrieved from <http://dx.doi.org/10.1037/0033-2909.121.1.65>
- Barkley, R., Murphy, K., & Fischer, M. (2008). *ADHD in adults: What the science says*. New York: Guilford Press.
- Bashford, C. W., Shaffer, B. J., & Young, C. M. (2012). Assessment of clinical judgment in nursing orientation: Time well invested. *Journal for Nurses in Staff Development*, *28*(2), 62-65. doi: 10.1097/NND.0b013e31824b4155

- Benham, B., & Hawley, D. (2015). The effectiveness of tools used to evaluate successful decision-making skills for applicants to healthcare graduate education programs: A systematic review. *JBL Database of Systematic Reviews and Implementation Reports*, 13(4), 231-75. doi:10.11124/jbisrir-2015-2322
- Best, J. R., & Miller, P. H. (2010). A developmental perspective on executive function. *Child Development*, 81(6), 1641–1660. <http://doi.org/10.1111/j.1467-8624.2010.01499.x>
- Best, J. R., Miller, P. H., & Naglieri, J. A. (2011). Relations between executive function and academic achievement from ages 5 to 17 in a large, representative national sample. *Learning and Individual Differences*, 21(4), 327-336. <https://doi.org/10.1016/j.lindif.2011.01.007>
- Blakemore, S. J., & Choudhury, S. (2006). Development of the adolescent brain: Implications for executive function and social cognition. *Journal of Child Psychology and Psychiatry*, 47(3-4), 296-312. doi:0.1111/j.1469-7610.2006.01611.x
- Boles, L. (2018). Predicting graduate school success in a speech-language pathology program. *Teaching and Learning in Communication Sciences & Disorders*, 2(2), Article 1. Retrieved from: <https://ir.library.illinoisstate.edu/tlcsd/vol2/iss2/1>
- Boone, K., Ghaffarian, S., Lesser, I., Hill-Gutierrez, & Berman, N. G. (1993). Wisconsin card sorting test performance in healthy, older adults: Relationship to age, sex, education, and IQ. *Journal of Clinical Psychology*, 49(1), 54-60. doi:10.1002/1097-4679(199301)49:1<54::AID-JCLP2270490108>3.0.CO;2-6
- Brown, T.E. (2005). *Attention Deficit Disorder: The unfocused mind in children and adults*. New Haven, CT: Yale University Press Health and Wellness (pp. 20-58).

- Bureau of Labor Statistics, (BLS), U.S. Department of Labor. (2018). *Occupational Outlook Handbook*, Speech-Language Pathologists. Retrieved from <https://www.bls.gov/ooh/healthcare/speech-language-pathologists.htm>
- Calhoun, J. (2006). Executive functions: A discussion of the issues facing children with autism spectrum disorders and related disorders. *Seminars in Speech and Language*, 27(1), 60-72. doi:10.1055/s-2006-932439
- Chan, R., Shum, D., Touloupoulou, T., & Chen, E. (2008). Assessment of executive functions: Review of instruments and identification of critical issues. *Archives of Clinical Neuropsychology*, 23(2), 201-216. doi: 10.1016/j.acn.2007.08.010
- Chou, L., Kuo, P., Lin, C., & Chen, C. (2010). Genetic and environmental influences on the Wisconsin Card Sorting Test performance in healthy adolescents: A twin/sibling study. *Behavior Genetics*, 40(1), 22-30. doi:10.1007/s10519-009-9299-3
- Ciairano, S., Visu-Petra, L., & Settanni, M. (2007). Executive inhibitory control and cooperative behavior during early school years: A follow-up study. *Journal of Abnormal Child Psychology*, 35, 335–345. Retrieved from <https://doi.org/10.1007/s10802-006-9094-z>
- Coppin, A. K., Shumway-Cook, A., Saczynski, J. S., Patel, K. V., Ble, A., Ferrucci, L., & Guralnik, J. M. (2006). Association of executive function and performance of dual-task physical tests among older adults: Analyses from the InChianti study. *Age and Ageing*, 35(6), 619-624. doi:10.1093/ageing/afl107
- Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA; 2017). Standards for accreditation of graduate education programs in audiology and speech-language pathology (2017). Retrieved from <http://caa.asha.org/wp-content/uploads/Accreditation-Standards-for-Graduate-Programs.pdf>

- Council of Academic Programs in Communication Sciences and Disorders & American Speech-Language-Hearing Association. (2018). Communication sciences and disorders (CSD) education survey national aggregate data report: 2016–2017 academic year. Retrieved from www.capcsd.org and www.asha.org.
- Darolia, R., Ptochnick, S., & Menifield, C. (2014). Assessing admission criteria for early and mid-career students from a U.S. MPA program. *Education Policy Analysis Archives*, *22*, 1-17. doi:10.14507/epaa.v22.1599
- Deicken, R.F, Merrin, E. L., Floyd, T.C., & Weiner, M. W. (1995). Correlation between left frontal phospholipids and Wisconsin Card Sort Test performance in schizophrenia. *Schizophrenia Research*, *14*(2), 177-181. doi: 10.1016/0920-9964(94)00036-8
- Demakis, G., & Becker, J. T. (2003). A meta-analytic review of the sensitivity of the Wisconsin Card Sorting Test to frontal and lateralized frontal brain damage. *Neuropsychology*, *17*(2), 255-264. doi:10.1037/0894-4105.17.2.255
- Denckla, M. B., & Reader, M. J. (1993). Education and psycho-social interventions: Executive dysfunction and its consequences. In R. Kurlan (Ed.), *Handbook of Tourette's Syndrome and related tic and behavioral disorders* (pp. 431–451). New York, NY: Marcel Dekker.
- Diamond, A. (2013). Executive functions. *Annual Review of Psychology*, *64*, 135-168.
<http://dx.doi.org/10.1146/annurev-psych-113011-143750>
- Dunlosky, J., & Metcalfe, J. (2009). *Metacognition*. Thousand Oaks, CA: Sage.
- Educational Testing Services (ETS, 2018). American Speech-Language-Hearing Association (ASHA) Test requirements. *The Praxis Tests Information Bulletin*. Retrieved from <https://www.ets.org/praxis/asha/requirements>

- Edwards, W. R., & Schleicher, D. J. (2004). On selecting psychology graduate students: Validity evidence for a test of tacit knowledge. *Journal of Educational Psychology, 96*(3), 592-602. <http://dx.doi.org.proxy.lib.odu.edu/10.1037/0022-0663.96.3.592>
- Eling, P., Derckx, K., & Maes, R. (2008). On the historical and conceptual background of the Wisconsin Card Sorting Test. *Brain and Cognition, 67*(3), 247-253. Retrieved from <https://doi.org/10.1016/j.bandc.2008.01.006>
- Elstein, A. S. & Schwartz, A. (2002). Clinical problem solving and diagnostic decision making: A selective review of the cognitive research literature. *British Medical Journal, 324*(7339), 729-732. doi:10.1136/bmj.324.7339.729
- Evans, C. (2017). Predictive validity and impact of CAEP Standard 3.2: Results from one master's-level teacher preparation program. *Journal of Teacher Education, 68*(4), 363-376. Retrieved from <https://doi-org.proxy.lib.odu.edu/10.1177/0022487117702577>
- Fan, J., McCandliss, B. D., Sommer, T., Raz, A., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience, 14*(3), 340-7. doi:10.1162/089892902317361886
- Figuroa, I. J., & Youmans, R. J. (2013). Failure to Maintain Set: A measure of distractibility or cognitive flexibility? Proceedings of the Human Factors and Ergonomics Society. Retrieved from <https://doi.org/10.1177/1541931213571180>
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new era of cognitive-developmental inquiry. *American Psychologist, 34*(10), 906-911. <http://dx.doi.org/10.1037/0003-066X.34.10.906>
- Forrest, K., & Naremore, R. C. (1998). Analysis of criteria for graduate admissions in speech-language pathology: Predictive utility of application materials. *American*

- Journal of Speech-Language Pathology*, 7(4): 57-61.
doi:10.1080/1360080X.2016.1182671
- Friedman, N., Miyake, A., Corley, R., Young, S., Defries, J., & Hewitt, J. (2006). Not all executive functions are related to intelligence. *Psychological Science*, 17(2), 172-179.
Retrieved from <http://www.jstor.org.proxy.lib.odu.edu/stable/40064389>
- Ganzach, Y. (1997). Theory and configurality in clinical judgments of expert and novice psychologists. *Journal of Applied Psychology*, 82(6), 954-960. doi:10.1037/0021-9010.82
- Grant, D. A., & Berg, E. (1948). A behavioral analysis of degree of reinforcement and ease of shifting to new responses in Weigl-type card-sorting problem. *Journal of Experimental Psychology*, 38(4), 404-411. doi:10.1037/h0059831
- Grego, A., & Golden, C. (2015). A-32 depression-severity impairs perceptual reasoning in Wisconsin Card Sort Task. *Archives of Clinical Neuropsychology*, 30(6), 497.
doi:10.1093/arclin/acv047.32
- Greve, K., Love, J., Sherwin, E., Mathias, C., Houston, R., & Brennan, A. (2002). Temporal stability of the Wisconsin Card Sorting Test in a chronic traumatic brain injury sample. *Assessment*, 9(3), 271-277. doi:10.1177/1073191102009003006
- Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate Data Analysis*. Seventh Edition. Upper Saddle River, NJ: Prentice Hall.
- Halberstam, B., & Redstone, F. (2005). The predictive value of admissions materials on objective and subjective measures of graduate school performance in speech-language pathology. *Journal of Higher Education Policy and Management*, 27, 261- 272.
Retrieved from <https://eric.ed.gov/?id=EJ691320>

- Harris, M. E. (1990). *Wisconsin Card Sorting Test: Computer Version*. (Research ed.). Odessa, FL: Psychological Assessment Resources.
- Hatchett, G.T., Lawrence, C., & Coaston, S.C. (2017). Re-examination of traditional admissions criteria in predicting academic success in a counselor education program. *International Journal for the Advancement of Counselling*, 39(1), 70-81. doi: 10.1007/s10447-016-9283-6
- Heaton, R. K. (1981). *Wisconsin Card Sorting Test manual*. Odessa, FL: Psychological Assessment Resources.
- House, J. D., & Johnson, J. J. (1993). Graduate Record Examination scores and academic background variables as predictors of graduate degree completion. *Educational and Psychological Management*, 53(2): 551-556. Retrieved from <https://doi.org/10.1177/0013164493053002025>
- Howell, L. L., Sorenson, C. D., & Jones, M. R. (2014). Are undergraduate GPA and general GRE percentiles valid predictors of student performance in an engineering graduate program? *International Journal of Engineering Education*, 30(5), 1145–1165.
- Jurado, M. B., & Rosselli, M. (2007). The elusive nature of executive functions: A review of our current understanding. *Neuropsychology Review*, 17(3); 213–233. doi:10.1007/s11065-007-9040-z
- Kantar, L., & Alexander, R. (2012). Integration of clinical judgment in the nursing curriculum: Challenges and perspectives. *The Journal of Nursing Education*, 51(8), 444-53. Retrieved from <https://doi.org/10.3928/01484834-20120615-03>

- Katz, J., Chow, C., Motzer, S., & Woods, S. (2009). The Graduate Record Examination: Help or hindrance in nursing graduate school admissions? *Journal of Professional Nursing*, 25(6), 369-372. doi:10.1016/j.profnurs.2009.04.002
- Kapa, L. L. (2013). *Executive function predicts artificial language learning in children and adults* (Order No. 3610336).
- Kienle, G. S., & Kiene, H. (2011). Clinical judgement and the medical profession. *Journal of Evaluation in Clinical Practice*, 17(4), 621–627. <http://doi.org/10.1111/j.1365-2753.2010.01560.x>
- King, J. H., Sweet, J. J., Sherer, M., Curtiss, G., and Vanderploeg, R. (2002). Validity indicators within the Wisconsin Card Sorting Test: Application of new and previously researched multivariate procedures in multiple traumatic brain injury samples. *The Clinical Neuropsychologist*, 16(4): 506–523. <https://doi.org/10.1076/clin.16.4.506.13912>
- Kirova, A.M., Bays, R.B., & Lagalwar, S. (2015). Working memory and executive function decline across normal aging, mild cognitive impairment, and Alzheimer's disease. *BioMed Research International*. Retrieved from <http://dx.doi.org.proxy.lib.odu.edu/10.1155/2015/748212>
- Kjelgaard, M., & Guarino, A. (2012). Assessing the predictive validity of the admission process in a master's level speech language pathology program. *Psychological Reports*, 111 (2), 613-617. doi:10.2466/03.15.28.PR0.111.5.613-617
- Krueger, A., & Wu, S. (2000). Forecasting job placements of economics graduate students. *The Journal of Economic Education*, 31(1), 81-94. doi:10.2307/1183344
- LeCrom, C., Rufer, L., Slavich, M., Dwyer, B., & Greenhalgh, G. (2016). Exploring predictors of graduate school and career success: A case study in sport management. *College*

- Student Journal*, 50(4), 513-530. Retrieved from <https://www.questia.com/read/1G1-474548661/exploring-predictors-of-graduate-school-and-career>
- Levine, D. (2017). Neural network models of human executive function and decision making. In E. Goldberg (Ed.), *Executive Functions in Health and Disease* (pp. 105-127). New York: Academic Press.
- Lewis, E. (2010). Emotional intelligence as a predictor for clinical performance in professional physical therapy students. *The Internet Journal of Allied Health Sciences and Practice*, 8(4), Article 6. Retrieved from <https://nsuworks.nova.edu/cgi/viewcontent.cgi?article=1318&context=ijahsp>
- Liu, O., Kligger, L., Bochenek, J., Holtzman, S., & Xu, L. (2016). An investigation of the use and predictive validity of scores from the GRE revised general test in a Singaporean university. *ETS Research Report Series*, 16, 2-32. doi:10.1002/ets2.12095
- Livesey, D., Keen, J., Rouse, J., & White, F. (2006). The relationship between measures of executive function, motor performance and externalising behaviour in 5-and 6-year-old children. *Human Movement Science*, 25(1), 50-64. doi:10.1016/j.humov.2005.10.008
- Mayer, J.D., Salovey, P., & Caruso, D. (2002). *Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) Version 2.0*. Toronto, Canada: Multi-Health Systems.
- McKee, A., Mallory, S., & Campbell, J. (2001). The Graduate Record Examination and undergraduate grade point average: Predicting graduate grade point averages in a Criminal Justice graduate program. *Journal of Criminal Justice Education*, 12(2), 311-317. <http://dx.doi.org/10.1080/10511250100086141>

- Miller, D.J., Spengler, E.S., Spengler, P.M., & Tracey, T.J.G. (2015). A meta-analysis of confidence and judgment accuracy in clinical decision making. *Journal of Counseling Psychology, 62*(4), 553-567. doi: 10.1037/cou0000105
- Miller, C., & Stassun K. (2014). A test that fails. *Nature, 510* (7504), 303–304.
doi:10.1038/nj7504-303a
- Moneta-Koehler L., Brown A.M, Petrie K.A., Evans B.J, & Chalkley, R. (2017). The limitations of the GRE in predicting success in biomedical graduate school. *PLOS ONE 12*(1), e0166742. <https://doi.org/10.1371/journal.pone.0166742>
- Naglieri, J., & Goldstein, S. (2013). *Comprehensive Executive Function Inventory*. [Measurement instrument]. <https://www.mhs.com/MHS-Assessment?prodname=cefi>
- Naglieri, J., & Goldstein, S. (2017). *Comprehensive Executive Function Inventory Adult* [Measurement instrument]. <https://www.mhs.com/MHS-Assessment?prodname=cefi-a>
- Newton, S., & Moore, G. (2007). Undergraduate grade point average and graduate record examination scores: The experience of one graduate nursing program. *Nursing Educational Perspectives, 28*, 327-331. Retrieved from EBSCOhost, <http://proxy.lib.odu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=c8h&AN=105865105&site=ehost-live&scope=site>.
- Norman, D. A., & Shallice, T. (1986). Attention to action. In *Consciousness and Self-Regulation* (pp. 1-18). Boston, MA: Springer.
- Oliveres-Urueta, M., & Williamson, J.W. (2013). Pre-admission factors and utilization of tutoring services in health profession education programs. *Journal of Allied Health, 42*(2), 74-78. Retrieved from <http://proxy.lib.odu.edu/login?url=https://search-proquest-com.proxy.lib.odu.edu/docview/1442705324?accountid=12967>

- Pachero, W., Noel, R., Porter, J., & Appleyard, C. (2015). Beyond the GRE: Using a composite score to predict the success of Puerto Rican students in a biomedical PhD program. *CBE Life Sciences Education, 14*(2), 11-17. doi: 10.1187/cbe.14-11-0216
- Polanyi, M. (1966). *The Tacit Dimension*. Gloucester, MA: Smith.
- Politser, P. (1981). Decision analysis and clinical judgement: A re-evaluation. *Medical Decision Making 1*(4), 361-389. doi: 10.1177/0272989X8100100406
- Reed, H. (2007). Identifying the admissions criteria that predict success in a master's level communicative sciences and disorders program at a historically black university. *E-Journal for Black and Other Ethnic Group Research and Practices in Communication Sciences and Disorders, 3*(2), 28-45. Retrieved from <http://www.nbaslh.org/assets/docs/ECHO/echo-vol3-no2.pdf>
- Rodriguez-Aranda, C., & Sundet, K. (2006). The frontal hypothesis of cognitive aging: Factor structure and age effects on four frontal tests among healthy individuals. *Journal of Genetic Psychology 163*(3), 269-297. doi: 10.3200/GNTP.167.3.269-287
- Roitsch, J., & Watson, S. (2017). *Predictors of Praxis examination success for graduate speech pathology students*. Unpublished manuscript.
- Ryan, W., Morgan, M., & Wacker-Mundy, R. (1998). Pre-admission criteria as predictors of selected outcome measures for speech language pathology graduate students. *Contemporary Issues in Communication Science and Disorders, 5*, 54-61.
- Schmidt, E. A., Homeyer, L. E., & Walker, J. L. (2011). Predictors of success on the counselor preparation comprehensive examination. *Counselor Education and Supervision, 48*: 226-238. doi:10.1002/j.1556-6978.2009.tb00077.x

- Sealy, L., Saunders, C., Blume, J., & Chalkley, R. (2018). The GRE over the entire range of scores lacks predictive ability for PhD outcomes in the biomedical sciences. *bioRxiv* 373225. Retrieved from <https://doi.org/10.1101/373225>
- Serra, M. J., & Metcalfe, J. (2009). Effective implementation of metacognition. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of Metacognition and Education* (pp. 278-298). New York, NY: Routledge.
- Sharpless, B. A., & Barber, J. P. (2013). Predictors of program performance on the Examination for Professional Practice in Psychology (EPPP). *Professional Psychology: Research and Practice*, 44(4), 208-217. doi:10.1037/a0031689
- Shonkoff, J. (2011). Building the brain's "air traffic control" system: How early experiences shape the development of executive function. *Harvard University Center on the Developing Child Working Paper*, 11, 1-17. Retrieved from www.developingchild.harvard.edu.
- Simmons, B. (2010). Clinical reasoning: Concept analysis. *Journal of Advanced Nursing* 66(5), 1151–1158. doi: 10.1111/j.1365-2648.2010.05262.x
- Simon, J. (1963). The Simon Task. Retrieved from <http://www.psytoolkit.org/experiment-library/simon.html>
- Smaby, M. H., Maddux, C. D., Richmond, A. S., Lepkowski, W. J. and Packman, J. (2005). Academic admission requirements as predictors of counseling knowledge, personal development, and counseling skills. *Counselor Education and Supervision*, 45: 43-57. doi:10.1002/j.1556-6978.2005.tb00129.x
- Society for Medical Decision Making (SMDM, 2018). Mission, Vision and Goals. Retrieved from <http://smdm.org/hub/page/mission-vision-and-goals/about>

- St. Clair-Thompson, H.L., & Gathercole, S.E. (2006). Executive functions and achievements in school: Shifting, updating, inhibition, and working memory. *Quarterly Journal of Experimental Psychology*, 59(4): 745-759. doi:10.1080/17470210500162854
- Steffani, S., & Slavin, D. (1997). Survey of the graduate school admissions process. *Contemporary Issues in Communication Sciences and Disorders*, (24), 11-21.
- Sternberg, R.J., & Williams, W.M. (1997). Does the Graduate Record Examination predict meaningful success in the graduate training of psychology? A case study. *American Psychologist*. 52(6), 630–641. doi:10.1037/0003-066x.52.6.630
- Suhayda, R., Hicks, F., & Fogg, L. (2008). A decision algorithm for admitting students to advanced practice programs in nursing. *Journal of Professional Nursing*, 24(5), 281-284. doi:10.1016/j.profnurs.2007.10.002
- Thieman, T., Weddle, M., & Moore, M. (2003). Predicting academic, clinical, and licensure examination performance in a professional (entry-level) master's degree program in physical therapy. *Journal of Physical Therapy Education*, 17(2), 32-37.
- Troche, J. & Towson, J. (2018). Evaluating a metric to predict the academic and clinical success of master's students in speech-language pathology. *Teaching and Learning in Communication Sciences & Disorders*, 2(2): Article 7. Retrieved from <https://ir.library.illinoisstate.edu/tlcsd/vol2/iss2/7>
- Tsuchiya, E., Oki, J., Yahara, N., & Fujieda, K. (2005). Computerized version of the Wisconsin Card Sorting Test in children with high-functioning autistic disorder or attention-deficit/hyperactivity disorder. *Brain and Development*, 27(3), 233-236. doi:10.1016/j.braindev.2004.06.008

Vestberg, T., Gustafson R., Maurex, L., Ingvar, M., & Petrovic, P. (2012) Executive functions predict the success of top-soccer players. *PLoS ONE* 7(4): e34731.

<https://doi.org/10.1371/journal.pone.0034731>

Victor, J. (2017). Improving clinical nursing judgment in prelicensure students. *The Journal of Nursing Education*, 56(12), 733-736. Retrieved from <https://doi.org/10.3928/01484834-20171120-05>

Wao, J. O., Ries, R., Flood, I., Lavy, S., & Ozbek, M. E. (2016). Relationship between admission GRE scores and graduation GPA scores of construction management graduate students.

International Journal of Construction Education & Research, 12(1), 37-53.

doi:10.1080/15578771.2015.1050562

Wagner, R. K. (1999). *CTOPP: Comprehensive Test of Phonological Processing*. Austin, Texas: Pro-Ed.

Appendix A. Literature Review Chart.

Authors	Discipline and <i>N</i>	Variables	Methods	Results/Conclusions	Recommendations
Studies indicating GRE is predictive of graduate school outcomes					
Baggs, Barnett, & McCullough (2015)	SLP; <i>N</i> =230	GRE scores, UGPA, course grades compared to Praxis II; cognitive variables compared to first-year clinical performance.	Multiple stepwise discriminant analysis of groups based on Praxis II scores (high, moderate low performance/ fail) & clinical performance	Praxis II scores predicted from GRE and ASHA’s science in-field UGPA and the GRE-T course grades should be statistically higher group means than high-need group for GRE-T and GRE-Q scores.	used when selecting or eliminating graduate SLP admissions
Boles (2018)	SLP, <i>N</i> =136	GRE Scores, letters of recommendation, grades	Regressions	GRE-V, GRE-Q and grades in UG Speech-Language Development course predictive of success on Praxis II	GRE and grades useful but need clinical metric
Hatchett, Lawrence, & Coaston (2017)	Counseling, <i>N</i> =146	UGPA, GRE-V, GRE- A-Writing, & GRE-Q, to predict GGPA and scores on Counselor Preparation Comprehensive Exam (CPCE).	Regressions	GRE and UGPA were predictors of CPCE scores; GRE-A writing did not make a distinct impact on outcomes	GRE and UGPA useful for predicting CPCE scores

Howell, Sorenson, & Jones (2014)	Engineering, <i>N</i> =92	UGPA, GRE-V, GRE-A, GRE-Q, GGPA, months to graduation, publication and advisor ratings.	Regressions	GRE-Q and UGPA strongest predictors of success	Use of quantitative information helps in admissions decisions for engineering programs
Kjelgaard & Guarino (2012)	SLP, <i>N</i> =122	UGPA, major, GRE scores, GGPA, Praxis II scores, clinical evaluation	Path analysis (i.e., multiple regression + causal theory)	GRE and UGPA stronger predictors of Praxis II scores. UG-SLP majors negatively associated with GRE-Q and GRE-V but positively related to UGPA.	Clinical success for graduate SLPs can be better understood via analysis of the student and the institution and GPA related to the field should be considered at admission
Krueger & Wu, (2000)	Economics, <i>N</i> =344	GRE-Math, GRE-Economics, GRE-V, GRE-A, UG college, country of origin, committee rating	Regression analysis	GRE-Math score, GRE-economics score, admissions committee ratings predicted job placement.	GRE useful when used with other information and human judgment of student ability and potential
McKee, Mallory, & Campbell, (2001)	Criminal justice, <i>N</i> =94	GRE-A scores, GRE-Q scores, GRE-V Scores, and UGPA on GGPA	Stepwise regression	GRE-Q and GRE-V alone did not evaluate potential success in graduate criminal justice program	Use of all three GRE subscales should be considered as subscales combined had most predictive power

Reed (2007)	SLP, <i>N</i> =43 (from historically black universities)	UGPA, Praxis II scores, GRE scores, GGPA, with focus on comparison of minority student outcomes to non-minorities	Multiple regression of variables	GRE-V & GRE-V+Q most significantly correlated to clinical practicum grades and also correlated to Praxis II scores	GRE scores and clinical grades should be considered, and letters of recommendation scrutinized to ensure minority student success
Ryan, Morgan, & Wacker-Mundy (1998)	SLP, <i>N</i> = 84	GRE-V; GRE-Q, GRE-A, GRE V=Q, GRE total, UGPA, SLP GPA, UG major/minor, interview, GGPA, National SLP and Audiology exam score (NESPA)	Correlational analysis, stepwise multiple regression	GRE scores weak predictors of graduate student performance. SLP UGPA was most significantly correlated to GGPA.	GRE Total scores, high SLP GPA are two of several scores that should be considered for graduate SLP program admission. Overall, current re-admission criteria have little association to outcomes in graduate SLP programs.
Schmidt, Homeyer, & Walker (2011)	Counseling <i>N</i> =403	CPCE based on UGPA, GRE-V, GRE-Q)	Multiple regressions	GRE scores and UGPA had a relationship to variations in CPCE total score ($R^2=.21$).	UGPA, GRE-V, and GRE-Q are valid tools to predict success on CPCE.

<p>Smaby, Maddux, Richmond, Lepkowski, & Packman (2005)</p>	<p>Counseling N=80</p>	<p>GRE-V, GRE-Q, UGPA predict performance on CPCE, Skilled Counselor Scale (SCS), Counselor Skills and Personal Development Rating Form (CSP)</p>	<p>Multiple regressions</p>	<p>GRE-V, UGPA predicted overall CPCE scores (although not ALL subtests). The SCS and CSP did not provide a predictive model.</p>	<p>Although correlations exists, admissions criteria should be scrutinized and weighted to provide the optimal predictive outcomes.</p>
<p>Sharpless & Barber (2013)</p>	<p>Psychology N=14,372</p>	<p>Examination for Professional Practice in Psychology (EPPP) based on degree, program prestige and selectivity, program specialty, student factors prior to graduate training, and GRE, GPA)</p>	<p>Simultaneous multiple regressions</p>	<p>GRE scores, percentage of minorities in programs and internship match rates consistently predicted EPPP scores.</p>	<p>Consider addition of other assessments, (possibly practice-based ones) to ensure most competent psychologists are trained</p>

Studies reporting negative outcomes/barriers to use of GRE as predictor of graduate school outcomes

Evans (2017)	Education, N=533	UGPA, GRE-General, GRE-V, GRE-Q, GRE-A scores, GGPA, age, ethnicity, gender, elementary or secondary education major to determine if new policy requirements impact admissions	Correlations Multiple regressions, validity analysis	UGPA moderately related to student success; GRE scores as criterion for admissions negatively limits number of admits	Implementing GRE scores reduces number of admitted candidates; UGPA would not impact or limit admissions
House & Johnson, (1993)	Psychology, N=250 (2 groups; professional psychology and general/experimental students)	GRE-V, GRE-Q, UGPA, GPA last 60 hours of undergraduate study, GPA for undergraduate psychology courses, and degree completion	Stepwise logistical regressions	GRE-V identified as best predictor of degree completion in professional psychology areas but last for generally/experimental psychology students	Predictor variables did not similarly or uniformly predict student outcomes; may prove beneficial based on graduate psychology track
Katz, Chow, Motzer, & Woods (2009)	Nursing N=217	Cumulative GPA, GRE-General, GRE-V, GRE-Q, GRE-VQ	Correlations	GRE did not serve as predictor of GPA	GRE barrier to admission to this nursing program
Suhayda, Hicks, & Fogg (2008)	Nursing N=738	Cumulative UGPA, nursing GPA, GRE-V, GRE-Q	Chi-square	CUMGPA of 3.25 and NSGGPA of 3.0 predicted success in 99% of the cases; GRE scores added no additional predictive value.	This program removed the GRE requirement for students who met GPA criteria.

Troche & Towson (2018)	SLP $N = 135$	GRE scores, UGPA; GGPA, 2 clinical coursework measures	Regressions	When weighted equally, UGPA, GRE-V, GRE-Q, GRE-W none predicted graduate student academic success as (i.e., GGPA) or clinical scores (i.e., the school's clinical checkpoint and Clinical Skill Acquisition Rubric). Differential weighting revealed each factor was predictive.	Suggest possible need to weight admissions criteria more appropriately and effectively during the graduate SLP admissions process.
Wao, Ries, Flood, Lavy, & Ozbek (2016)	Construction Management $N=329$	GRE -V, GRE-Q GRE-A, GRE Total, success in program GGPA	Correlations, logistic regressions	GRE-Q was better predictive variable of GGPA but overall GRE not effective predictor of success	Construction programs should reconsider use of GRE during admission process

Studies reporting UGPA to predict graduate school success

Darolia, Potochnick & Menifield (2014)	Public Administration, <i>N</i> =223	GGPA, GRE (or GRE waiver), Years of experience, UGPA	Correlational analysis, regression analysis	GRE score, UGPA and type of undergraduate institution type predicted graduate performance. Value of admissions criteria differ based on when students enter graduate school.	UGPA is strongest and most predictive indicator of graduate school success. Developing more appropriate admissions criteria for mid-career students is warranted.
Forrest & Naremore (1998)	SLP; <i>N</i> =30	UGPA; GRE-V, GRE-Q, GRE-A; subjective evaluation of the quality of the undergraduate institution attended; undergraduate degree; student class rank	Stepwise discriminant analysis of variables	UGPA most predictive variable of graduate student's success (i.e., predicted student achievement with 93% accuracy); GRE scores less predictive	GRE scores may not be useful predictors of success and requirements of clinical training should be considered during admissions

Halberstam & Redstone (2005)	SLP, <i>N</i> =21	UGPA (general), UGPA for SLP prerequisite courses; GGPA, age (at admission); UG major; ESL; letters of recommendation; previous work experience.	Correlational analysis	GGPA correlated with SLP prerequisites GPA; UGPA; essay quality; letters of recommendation	Admissions decisions should consider UGPA in undergraduate SLP prerequisite courses and letters of recommendation
Newton & Moore, (2007)	Nursing, <i>N</i> =120	UGPA and sections of the GRE	Regression to examine effect of UGPA on all three sections of GRE	UGPA significantly predicted GRE-V and GRE-Q	UGPA may be better predictor of graduate nursing success than GRE scores
Thieman, Weddle, & Moore (2003)	PT, <i>N</i> = 121	UGPA (general and PT-specific), GRE scores, admissions committee assessments, GGPA (in PT), Clinical Performance Instrument (CPI) and National PT licensure scores (NPTE) scores	Retrospective, multiple regression	Preadmission grades predicted grades; PTGPA was best predictor of NPTE scores.	PT grades moderately predicted by admissions criteria but license exams only weekly predictable. Clinical performance is not predictable based on current admissions criteria.

Studies reporting alternative testing measure to predict graduate school success

Edwards & Schleicher, (2004)	Psychology <i>N</i> =70	Tacit Knowledge (TK) scores, GRE, School Success, personality variables, and UGPA	Descriptive statistics, factor analysis	TK had greater predictive value than GRE scores in predicting graduate school performance	Alternative measures, such as TK assessments, may be more valid predictors of graduate student success.
Lewis (2010)	PT, <i>N</i> =56	Clinical performance scores, Emotional Intelligence Test scores, GRE scores, pre-requisite GPA, demographics	Correlations, regressions	No scores were significantly related to emotional intelligence	Further investigation of emotional intelligence and clinical success/failure is needed

Appendix B: Academic Variables Correlation Table

		Academic Variables			
		GREQ	GREV	GRE A	Praxis II
UGPA	Pearson Correlation	0.202	0.212	-.346*	0.276
	Sig. (2-tailed)	0.230	0.208	0.036	0.109
GGPA	Pearson Correlation	.349*	-0.228	-0.042	0.310
	Sig. (2-tailed)	0.035	0.174	0.805	0.070
WCSTtrialsadmin	Pearson Correlation	-0.290	-0.071	0.126	-0.162
	Sig. (2-tailed)	0.082	0.675	0.459	0.354
WCSTtotalcorrect	Pearson Correlation	-0.291	0.316	0.069	0.323
	Sig. (2-tailed)	0.081	0.057	0.684	0.058
WCSTtotalerrors	Pearson Correlation	-0.212	-0.169	0.217	-0.212
	Sig. (2-tailed)	0.208	0.318	0.198	0.220
WCSTperseverativeresp	Pearson Correlation	-0.234	-0.192	0.181	-0.278
	Sig. (2-tailed)	0.164	0.254	0.282	0.106
WCSTperseverr	Pearson Correlation	-0.244	-0.206	0.151	-0.276
	Sig. (2-tailed)	0.146	0.221	0.372	0.108
WCSTnonperseverr	Pearson Correlation	-0.160	-0.115	0.229	-0.150
	Sig. (2-tailed)	0.344	0.496	0.172	0.388
WCSTconceptlevresp	Pearson Correlation	-0.141	0.229	-0.156	0.104
	Sig. (2-tailed)	0.406	0.172	0.357	0.554
WCSTcatcomple	Pearson Correlation	0.060	-0.051	-0.301	0.225
	Sig. (2-tailed)	0.724	0.766	0.071	0.194
WCSTtrialscomplefir	Pearson Correlation	0.017	-0.031	0.137	-0.132
	Sig. (2-tailed)	0.919	0.856	0.420	0.448
WCSTfailmainset	Pearson Correlation	-0.199	0.137	0.066	-0.122
	Sig. (2-tailed)	0.238	0.418	0.696	0.486

WCSTItol	Pearson Correlation	0.159	-0.019	-.387*	0.172
	Sig. (2-tailed)	0.348	0.911	0.018	0.323
CEFIfullscss	Pearson Correlation	0.221	0.030	-0.138	0.315
	Sig. (2-tailed)	0.240	0.876	0.466	0.102
CEFIattention	Pearson Correlation	0.308	0.002	-0.084	0.293
	Sig. (2-tailed)	0.097	0.991	0.660	0.130
CEFIemotionregulation	Pearson Correlation	0.229	0.236	0.030	0.120
	Sig. (2-tailed)	0.223	0.210	0.876	0.543
CEFIflex	Pearson Correlation	0.089	0.152	-0.099	0.296
	Sig. (2-tailed)	0.639	0.422	0.602	0.127
CEFIinhibcont	Pearson Correlation	0.175	-0.024	-0.178	0.244
	Sig. (2-tailed)	0.355	0.902	0.347	0.210
CEFIinit	Pearson Correlation	-0.004	0.031	-0.044	.432*
	Sig. (2-tailed)	0.982	0.871	0.817	0.022
CEFIorg	Pearson Correlation	0.257	-0.032	-0.188	0.329
	Sig. (2-tailed)	0.170	0.867	0.320	0.087
CEFIplan	Pearson Correlation	0.249	0.085	-0.087	0.281
	Sig. (2-tailed)	0.184	0.655	0.649	0.148
CEFIselfmon	Pearson Correlation	0.158	-0.005	-0.140	0.227
	Sig. (2-tailed)	0.405	0.981	0.459	0.245
CEFIwm	Pearson Correlation	0.202	-0.057	-0.121	0.165
	Sig. (2-tailed)	0.283	0.764	0.523	0.400

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix C: Clinical Variables Correlation Table

		Clinical Variables			
		EBSR s	ClinicalFinal I	ClinicIIFinal I	ClinicIIIFinal I
UGPA	Pearson Correlatio n	0.309	0.237	.330*	0.048
	Sig. (2- tailed)	0.071	0.157	0.046	0.778
GGPA	Pearson Correlatio n	.461**	.387*	.448**	0.225
	Sig. (2- tailed)	0.005	0.018	0.005	0.180
WCSTtrialsadmin	Pearson Correlatio n	-0.236	-0.240	-0.269	-0.249
	Sig. (2- tailed)	0.172	0.152	0.108	0.137
WCSTtotalcorrect	Pearson Correlatio n	.472**	-0.142	-0.045	-0.259
	Sig. (2- tailed)	0.004	0.403	0.793	0.122
WCSTtotalerrors	Pearson Correlatio n	-0.200	-0.294	-.339*	-0.234
	Sig. (2- tailed)	0.249	0.078	0.040	0.163
WCSTperseverativeres p	Pearson Correlatio n	-0.087	-0.323	-.347*	-0.265
	Sig. (2- tailed)	0.618	0.051	0.035	0.114
WCSTperseverr	Pearson Correlatio n	-0.106	-0.292	-.325*	-0.255
	Sig. (2- tailed)	0.545	0.080	0.050	0.127
WCSTnonperseverr	Pearson Correlatio n	-0.228	-0.280	-0.316	-0.235
	Sig. (2- tailed)	0.187	0.093	0.056	0.161

WCSTconceptlevresp	Pearson Correlation	-0.088	0.170	0.184	0.063
	Sig. (2-tailed)	0.616	0.313	0.275	0.710
WCSTcatcomple	Pearson Correlation	0.165	0.280	0.268	0.186
	Sig. (2-tailed)	0.342	0.093	0.109	0.271
WCSTtrialscomplefir	Pearson Correlation	-0.080	-0.101	0.000	0.083
	Sig. (2-tailed)	0.647	0.551	0.999	0.626
WCSTfailmainset	Pearson Correlation	-0.289	0.030	-0.081	-0.063
	Sig. (2-tailed)	0.093	0.858	0.632	0.711
WCSTltol	Pearson Correlation	0.128	0.254	.367*	.334*
	Sig. (2-tailed)	0.462	0.130	0.026	0.043
CEFIfullscss	Pearson Correlation	0.236	0.095	-0.030	-0.136
	Sig. (2-tailed)	0.228	0.616	0.876	0.473
CEFIattention	Pearson Correlation	0.218	0.076	0.026	-0.099
	Sig. (2-tailed)	0.264	0.691	0.891	0.603
CEFIemotionregulation	Pearson Correlation	0.270	-0.104	-0.257	-.409*
	Sig. (2-tailed)	0.165	0.584	0.170	0.025
CEFIflex	Pearson Correlation	0.149	-0.064	0.022	-0.141
	Sig. (2-tailed)	0.451	0.738	0.907	0.458

CEFIinhibcont	Pearson Correlation	0.335	0.137	-0.098	-0.012
	Sig. (2-tailed)	0.082	0.470	0.606	0.949
CEFIinit	Pearson Correlation	0.204	-0.001	-0.017	-0.194
	Sig. (2-tailed)	0.297	0.996	0.927	0.304
CEFIorg	Pearson Correlation	0.252	0.289	0.103	0.063
	Sig. (2-tailed)	0.196	0.121	0.587	0.742
CEFIplan	Pearson Correlation	0.250	0.116	0.043	-0.094
	Sig. (2-tailed)	0.199	0.543	0.820	0.622
CEFIselfmon	Pearson Correlation	-0.108	0.024	-0.011	-0.222
	Sig. (2-tailed)	0.583	0.900	0.953	0.238
CEFIwm	Pearson Correlation	0.182	0.079	-0.096	-0.036
	Sig. (2-tailed)	0.353	0.679	0.613	0.849

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix D: IRB Letter



OFFICE OF THE VICE PRESIDENT FOR RESEARCH

Physical Address

4111 Monarch Way, Suite 203
Norfolk, Virginia 23508

Mailing Address

Office of Research
1 Old Dominion University
Norfolk, Virginia 23529
Phone(757) 683-3460
Fax(757) 683-5902

DATE: May 23, 2018

TO: Silvana Watson
FROM: Old Dominion University Institutional Review Board

PROJECT TITLE: [1071045-6] Predictors of Praxis Examination Success for Graduate Speech Pathology Students

REFERENCE #: 17-095; 18-085
SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED
APPROVAL DATE: May 23, 2018
EXPIRATION DATE: May 16, 2019
REVIEW TYPE: Full Committee Review

Thank you for your submission of Continuing Review/Progress Report materials for this project. The Old Dominion University Institutional Review Board has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Full Committee Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this committee. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this committee.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of May 16, 2019.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Danielle Faulkner at (757) 683-4636 or dcfaulkn@odu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Old Dominion University Institutional Review Board's records.

CURRICULUM VITAE

Jane Roitsch, MA, CCC-SLP, MBA

216-334-7628

1915 A. Escadrille Point, Norfolk, VA 23508

jroitschl@gmail.com

Education

Old Dominion University, Norfolk, VA

Doctoral Candidate, Special Education, anticipated graduation December 2018.

Case Western Reserve University, Cleveland, OH

Weatherhead School of Management, Executive Master of Business Administration 2012.

The Ohio State University, Columbus, OH

Master of Arts, Speech-Language Pathology, 1999.

Butler University, Indianapolis, IN

Bachelor of Arts, Speech-Language Pathology, 1997.

Butler University, Indianapolis, IN

Bachelor of Arts, Public and Corporate Communications, 1994.

Publications

Peer-Reviewed

Raymer, A.M., **Roitsch, J.E.**, Redman, R., Michalek, A.M.P., & Johnson, R.K. (2018, online). Critical appraisal of systematic reviews of executive function treatments in TBI. *Brain Injury*.

Roitsch J.E. (2018, November). Relationship between executive functions & social skills of students with language learning disability: Literature review. Poster to be presented at the American Speech-Language-Hearing Association National Convention, Boston, MA.

Roitsch J.E., Redman, R., Johnson, R.K, Michalek, A.M.P, & Raymer, S.A. (2018). Quality appraisal of systematic reviews for behavioral treatments of attention disorders in traumatic brain injury. *Journal of Head Trauma Rehabilitation*.

Prasse J.E., Kikano G.E. (2009). Pediatric dysphagia. *Clinical Pediatrics*, 48(3):247-251.

Prasse, J.E. (2008). Results of surface electrical stimulation followed by thermal-tactile stimulation on a 20-year-old male status/post closed head injury and resulting severe oropharyngeal dysphagia. *Dysphagia*, 23(4):438.

Prasse J.E., & Kikano G.E. (2008). Stuttering: An overview. *American Family Physician*, 77(9):1271-1276.

Prasse J.E., & Kikano G.E., (2004). Dysphagia in the elderly. *Advanced Studies in Medicine, Johns Hopkins Medical Journal*, Nov/Dec 10: 527-533.

Other Publications

Prasse J.E. (2008). Dysphagia. *Encyclopedia of Aging and Public Health*. Lous, S.; Sajatovic, M. (Eds). Springer: NY.

Prasse J.E. (2008). Speech disorders. *Encyclopedia of Aging and Public Health*. Lous S; Sajatovic M (Eds). Springer: NY.

Russell L.E., & Prasse J.E. (2005). Cochlear implants: A closer look at a unique population. *Hearsay Journal of the Ohio Speech-Language-Hearing Association*, 17: 63-66.

Presentations

- Roitsch, J.E.** (Poster accepted for 2019, March). EFs and social skills in students with LLD. Richmond, VA.
- Roitsch, J.E.** (2018, November). Relationship between executive functions & social skills of students with language learning disability: Literature review. ePoster to be presented at the American Speech-Language-Hearing Association National Convention, Boston, MA.
- Roitsch, J.E.,** Phalen, L. & Watson, S. (2018, February). Predictors of comfort level in speech-language pathologists (SLPs) working with students with Attention Deficit Hyperactivity Disorder (ADHD). Poster presented at the International Neuropsychological Society 2018 Annual Meeting. Washington, DC.
- Roitsch, J.E., & Watson, S.** (2018, March). Higher education instructors: Perceptions of free speech on college campuses. Poster presented at the Speech and Hearing Association of Virginia Annual Conference. Richmond, VA.
- Roitsch, J.E.,** Murphy, K.A., & Michalek, A.M.P. (2017). Effects of self-regulated strategy development on the writing skills of school-age children with attention-deficit/hyperactivity disorder. *EBP Briefs* 12(4), 1-11.
- Roitsch, J.E.,** Michalek, A.M.P., Springle, A., Gumpert, M., Murphy, K.A., & Raymer, S.A. (2017, November). Executive function & writing disability: A review of systematic reviews & meta-analyses. Poster presented at the American Speech-Language-Hearing Association National Convention, Los Angeles, CA.
- Roitsch, J.E.,** Phalen, L., & Watson, S. (2017, November). Predictors of comfort level in speech-language pathologists working with students with Attention Deficit Hyperactivity Disorder. Poster presented at the American Speech-Language-Hearing Association National Convention, Los Angeles, CA.
- Gumpert, M., **Roitsch, J.E.,** Springle, A., Morin, L., Michalek, A., Watson, S., & Raymer, S. (2017, October). Writing interventions for learning disabilities: An appraisal of systematic reviews. Poster presented at the Council for Learning Disabilities 39th International Conference on Learning Disabilities, Baltimore, MD.
- Roitsch, J.E.** (2017). ADHD and Speech Pathology. Presentation at the Virginia Educational Research Association Conference, Charlottesville, VA.
- Roitsch, J.E.** and Watson, S. (2017). ADHD in the clinical setting: A survey of speech-language pathologists. Poster presented at the Annual Graduate Research Achievement Day (GRAD), Old Dominion University, Norfolk, VA.
- Roitsch, J.E.** and Watson, S. (2017). ADHD in the clinical setting: A survey of speech-language pathologists. Poster presented at the Speech and Hearing Association of Virginia Annual Conference, Richmond, VA.
- Roitsch, J.E.** and Watson, S. (2016). ADHD in the clinical setting: A survey of speech-language pathologists. Poster presented at the American Speech-Language-Hearing Association National Convention, Philadelphia, PA.

- Prasse J.E.** and Jadack R. (2009). Self-Reported eating difficulties of persons with laryngectomy. Poster presented at the American Speech-Language-Hearing Association National Convention, New Orleans, LA.
- Prasse, J.E.** (2008). Understanding individuals with Asperger’s syndrome or high functioning autism. Presenter, University Hospitals of Cleveland, Cleveland, OH.
- Roitsch, J.E.** (2007). Case study: Voice function and speech intelligibility of a person with ALS prior to and following surgery to implant diaphragm pacing device. Care of the professional voice. Poster presented at The Voice Foundation’s 36th Annual Symposium, Philadelphia, PA.
- Roitsch, J.E.**, et al. (2006). Co-Author, ASHA, Vowel phonation duration of ALS Patients after diaphragm pacing implantation. Poster presented at the American Speech-Language Hearing Association National Convention, Miami, FL.
- Roitsch, J.E.**, et al. (2006). Pediatric dysphagia. Poster presented at 5th Annual Perinatal Conference: Safe Passage: Reducing Risk and Liability, Columbus, OH.
- Roitsch, J.E.**, et al. (2006). A clinical, school and home-based approach to working with children with auditory processing disorders. Presenter for Lorman Education Services, Akron, OH.
- Roitsch, J.E.** (2006). Speech Pathology and the child with CAPD. Teleseminar presenter, Lorman Education Services.
- Roitsch, J.E.** (2006). Presentation at the Shaping the Future of Maternal & Child Health, Cleveland, OH.
- Roitsch, J.E.** (2005). Presenter at Suddenly Senior Event, Intercontinental Hotel, Cleveland, OH.
- Roitsch, J.E.** (2005). Empowering children who stutter, continuing education course. Presentation at University Hospitals of Cleveland, Cleveland, OH.

Professional Experience

Academic Appointments

- | | |
|----------------|--|
| 2018 – present | <i>Lecturer, Department of Communication Sciences and Disorders, Old Dominion University, Norfolk, VA</i> |
| 2015 – 2018 | <i>Adjunct Instructor, Department of Communication Sciences and Disorders, Old Dominion University, Norfolk, VA</i> |
| 2012 - present | <i>Adjunct Instructor, Department of Communication Sciences, University of Nebraska at Kearney, Kearney, NE</i> |
| 2005 – 2007 | <i>Adjunct Instructor, Department of Speech and Hearing Sciences, Cleveland State University, Cleveland, OH</i> |
| 2004 – 2005 | <i>Part-time Lecturer, Department of Communication Sciences, Case Western Reserve University, Cleveland, OH</i> |
| 1997 – 1999 | <i>Student Lecturer and Academic Advisor
The Ohio State University, Columbus, OH</i> |

Other Experiences

- 2013-2014 Senior Project Manager, Stamford Health System, Stamford, CT
- 2008-2013 Supervisor, Rehabilitation Department, Stamford Health System, Stamford, CT
- 2004-2007 Supervisor, Speech-Language Pathology Division
University Hospitals Case Medical Center and Rainbow Babies and Children's Hospital, Cleveland, OH
- 2004-2007 Clinical Fellowship Supervisor, Speech-Language Pathology, Ohio State Board of Speech-Language Pathology and Audiology, Columbus, OH
- 2001-2007 Senior Speech-Language Pathologist, University Hospitals Case Medical Center and Rainbow Babies and Children's Hospital, Cleveland, OH
- 2007 Clinical Supervisor, Cleveland State Speech and Hearing Clinic, Cleveland, OH
- 2006-2007 Guest Editor, Hearsay, The Journal of the Ohio Speech-Language-Hearing Association.

Part-Time Speech-Language Pathologist:

- 2004-2005 Fernandez and Associates, Wickliffe County Place, Wickliffe, OH
- 2003-2004 Breckenridge Village, Fairmount Health Center, Willoughby, OH
- 2000-2002 The Cleveland Clinic Foundation, Ashtabula County Medical Center Branch, Ashtabula, OH; Keisel Home Therapy, Ashtabula, OH; Premier Rehabilitation Services, Austintown, OH; RehabWorks, Inc., Rehabilitation Services, Boardman, OH; Avalon Rehabilitation Services, Warren, OH
- 2000-2001 Senior Speech-Language Pathologist. Carington Park Long-Term Care Facility and Head Injury Unit, Ashtabula, OH
- 1999-2001 Staff Speech-Language Pathologist, TheraPeak, Inc., Long-Term Care Facility and Skilled Nursing Unit, Geneva, OH
- 1999-2007 Private Practice, Mentor, OH
- 1998-1999 Student Intern, Thomas Worthington High School, Worthington, OH
- 1997-1999 Student Clinician, The Ohio State University Speech and Hearing Clinic, Columbus, OH
- 1996-1997 Assistant to Vice President, National Association of Mutual Insurance Companies, Indianapolis, IN
- 1994-1996 Editor, Themis, Zeta Tau Alpha Fraternity Magazine Indianapolis, IN

Awards

- 2017 Doctoral Fellowship, Old Dominion University
- 2017, 2016 Dean's Travel Award, Old Dominion University

Certifications

PREDICTING SPEECH-LANGUAGE PATHOLOGY GRADUATE STUDENT SUCCESS102

2000- present	ASHA Certification, Member #12010683 Lean Six Sigma, Green Belt Certification, Stamford Hospital A3 Certification, Stamford Hospital License
2014-present	Virginia Speech-Language Pathology, License # 2202007603 Professional Membership
2016-present	Virginia Council for Learning Disabilities
2016-present	Council for Learning Disabilities
1999-present	ASHA