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Predicting Graduate School Success in a Speech-Language Pathology Program

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Abstract

Graduate programs in speech-language pathology continue to experience high volumes of applicants seeking admission. There appear to be as many configurations of admission criteria as there are graduate programs. Yet, what evidence do we have for these criteria making a difference in graduate student outcome? Graduate Record Examination (GRE) scores, undergraduate grade point average (GPA), prerequisite GPA, letters of recommendation, and letters of intent are valued differently by programs. These variables were investigated for their value in predicting successful graduate school outcome in a program of speech-language pathology. Three measures proved predictive: the verbal portion of the GRE, the quantitative portion of the GRE, and the grade in the speech and language development course taken prior to admission.

Keywords

graduate school, communication sciences and disorders, speech-language pathology, success, GRE, grade point average, GPA

Graduate programs in speech-language pathology (SLP) continue to experience high volumes of applicants seeking admission. Graduate programs use a variety of admission criteria but evidence is scarce for these criteria supporting graduate student outcome. Still rarer are studies investigating outcome and admission criteria in SLP graduate programs. This article reviews relevant literature regarding graduate student success, followed by analysis of one graduate program's admission criteria and the resulting outcome. Finally, recommendations for implementing and monitoring graduate program admission criteria are offered.

Review

The following review provides evidence from five fields of study outside of communication sciences and disorders (CSD), followed by a review of two studies in CSD (see Table 1). Darolia, Ptochnick, and Menifield, (2014) examined the records of 223 Master of Public Affairs (MPA) applicants. The authors noted that grade point average (GPA) could be an unreliable variable in predicting graduate school success due to grade inflation, with a concern regarding its use as an exclusive criterion for admission. They used GRE scores, undergraduate GPA, the selectivity of the undergraduate institution, and undergraduate major as independent variables to determine graduate school success. Interestingly, these authors used graduate school GPA as the dependent variable (i.e., to define "success") after arguing against using undergraduate GPA as an admission criterion because of grade inflation. The students were placed into one of three groups: a) early career applicants (what some institutions would term "traditional" students), with no previous experience or employment in the field, and two groups of mid-career applicants, b) those for whom the GRE requirement was waived due to certain criteria (e.g., military service, professional experience, or possessing an additional graduate degree), and c) a mid-career group of applicants who took the GRE. Darolia and colleagues (2014) found that undergraduate GPA was the strongest predictor of graduate success for all groups, although GRE scores added predictive value. There were no significant differences between groups in either undergraduate GPA or graduate-level outcome GPA. These results were consistent with the earlier findings of MPA students by Leavitt, Lombard and Morris (2011), although the latter results did not find the GRE scores to be significantly related to program GPA. The results of Darolia et al. (2014) were also consistent with those of Ragothaman, Carpenter, and Davies (2009), although these authors also found significant correlations between graduate GPA and scores on the quantitative portion of the Graduate Management Admission Test (GMAT).

Graham (1991) conducted a retrospective study of recent graduates of a Master of Business Administration (MBA) program. Similar to Darolia and colleagues (2014), Graham used graduate school GPA as the dependent variable representing graduate school success, and 10 independent variables as predictors, in a multiple regression analysis. The most consistent finding was the GMAT as a predictor of the graduate GPA. Some of these students had not taken the GMAT, but instead took the Millers Analogy Test, and that measure also significantly predicted success.

Table 1. Findings of previous studies.

Study	Field	Independent Variables	Dependent Variable(s)	Findings
Darolia, Ptochnick, &	Master of Public Affairs	GRE scores, UGPA,	GGPA	UGPA best predictor of GGPA

Study	Field	Independent Variables	Dependent Variable(s)	Findings
Menifield (2014)		selectivity of undergraduate institution, undergraduate major		
Graham (1991)	MBA	10 Independent variables	GGPA	UGPA best predictor of GGPA
Dunlap, Henley, & Fraser (1998)	Social Work	11 independent variables	Comprehensive exam scores	Significant relationships between comps and GRE; significant relationship between comps and UGPA. Both relationships weak
Newton & Moore (2007)	Nursing	UGPA	GRE	UGPA predicted Verbal and Quantitative GRE.
LeCrom, Rufer, Slavich, Dwyer & Greenhalgh (2016)	Sports Management	13 independent variables	GGPA, number of failed comprehensive exams	None of the criteria predicted success
Halberstam & Redstone (2005)	SLP	4 independent variables	GGPA	UGPA, SLP core courses, letters of recommendation, letters of intent each predicted GGPA.
Forrest & Naremore (1998)	SLP	GRE, UGPA	Placement in low performing or high performing group	UGPA was more predictive of success, although GRE was also predictive

UGPA = undergraduate grade point average; GGPA = graduate grade point average; MBA = Master of Business Administration; GRE = Graduate Record Examination; SLP = speech-language pathology

Dunlap, Henley, and Fraser (1998) retrospectively studied the records of 654 social work graduates, using the results of a comprehensive examination as the dependent variable. The independent

variables were background characteristics (age, gender, race, and any paid social work experience prior to admission), educational characteristics (undergraduate major, type of degree, and baccalaureate school status) GPA for the most recent two years of undergraduate study, and GRE scores. Significant ($p<.001$) relationships were found between comprehensive examination scores and combined GRE scores, although the predictive value was modest ($R^2 = .13$). A significant ($p<.001$) relationship was also found between the comprehensive examination and undergraduate GPA, although this variable had a weak predictive value ($R^2 = .02$).

Newton and Moore (2007), rather than examining outcome in nursing students, sought to determine whether the undergraduate grade point average (UGPA) was predictive of GRE scores. They determined that indeed the UGPA predicted ($p<.05$) verbal and quantitative scores on the GRE.

LeCrom, Rufer, Slavich, Dwyer, and Greenhalgh (2016) analyzed data from questionnaires from 104 alumni of a sports management program. The independent variables included in the study were gender, ethnicity, age, type of student (on-campus or distance learning), UGPA, DGPA (the Department's decision minimum GPA), test score, full-time sport work experience, part-time sport work experience, full-time non-sport work experience, part-time non-sport work experience, student-athlete, and industry desired. The measures of success (i.e., the dependent variables) were graduate GPA, and number of failed comprehensive examinations (out of a possible six). These authors concluded that none of their admission criteria predicted success in graduate school.

Halberstam and Redstone (2005) examined undergraduate GPA, SLP prerequisite GPA, quality of letters of recommendation, and quality of letters of intent in a sample of 23 SLP graduate students, comparing these predictor variables with graduate GPA. Each of these variables significantly predicted graduate GPA. However, it should be noted that the performance in graduate school could have been inadvertently biased by the prior knowledge of each student's prerequisite GPA. Further, the judgment of each student's letters of recommendation and personal essays (that is, the subjective measures) were made after the students had graduated—that is, after the rater knew of the students' performance in graduate school, hence another opportunity for unintended bias. However, these findings were consistent with those of previous research (e.g., Dunlap et al., 1998; Newton & Moore, 2007).

Forrest and Naremore (1998) found similar results in a sample of 45 students, but went further in stating that Graduate Record Examination (GRE) scores were much less predictive than undergraduate GPA, when using final graduate GPA as the dependent variable. However, success was defined as placement in a "low" performing group versus a "high" performing group (determined retrospectively, after the student had graduated). That is, were undergraduate GPA's, or GRE scores more predictive of placement into the low- versus high-performing group? Although undergraduate GPA was more predictive of "success" as defined by this group placement, both GPA and GRE scores contributed significantly.

In summary, mixed results were found in the above studies regarding the predictive value of the criteria used for admission to graduate school. Further, the range of findings was quite varied, from no predictors, to all GRE scores plus undergraduate GPA.

Based on the above findings, this author made some decisions regarding the research question, the dependent variable, and the independent variables. Graduate GPA appeared to be problematic as the gold standard of success because of possible unintended bias and grade inflation. Grade inflation has been well documented (e.g., Kostal, Kuncel, & Sackett, 2016; Kuncel & Hezlett, 2007; Rojstaczer & Healy, 2012), and there was potential for higher grades to be assigned by faculty to those students with better performance at the undergraduate level, and of course lower grades to those with poorer performance. In the current study, about 1/3 of the students had completed their undergraduate program at University of the Pacific, which provided another potential source of bias. In any case, the interest for this study was the success of the students on a wider playing field than the grades by the professors who taught them. An external objective measure, conducted by an organization unfamiliar with the graduating participant, was judged the most appropriate outcome variable for defining success.

The Praxis

The Educational Testing Service (ETS) (2015) created the Praxis Series® for the purpose of providing testing tools to support the licensure and certification process of states. Many different Praxis tests exist, from more general assessments for teacher certification to the Praxis Subject Assessments, including the SLP assessment (heretofore "the Praxis") of interest for this study.

The Praxis is developed using guidelines from the Standards for Educational and Psychological Testing (ETS, 2015), as follows:

- Clearly define the purpose of the test and the claims one wants to make about the test takers
- Develop and conduct job analysis/content validation surveys to confirm domains of knowledge to be tested
- Develop test specifications and test blueprints consistent with the purpose of the test and the domains of knowledge defined by the job analysis
- Develop specifications for item types and numbers of items needed to adequately sample the domains of knowledge validated by the job analysis survey
- Develop test items that provide evidence of the measurable-behavior indicators detailed in the test specifications
- Review test items and assembled test forms so that each item has a single best defensible answer and assesses content that is job relevant
- Review test items and assembled forms for potential fairness or bias concerns, overlap, and cueing, revising or replacing items as needed to meet standards (ETS, 2015, p. 11)

The format for the Praxis is multiple-choice questions, administered in one, 150-minute sitting. A passing score of 162 out of a possible 200 (81%) was established by ASHA (2017). The content of the Praxis is developed as follows: Every 5-7 years a panel of experts is consulted by ASHA to provide a description of job tasks and a description of knowledge, skills and abilities believed necessary by speech-language pathologists (SLPs). In addition, surveys of practitioners, educators, clinical supervisors, and clinic directors is conducted over 12 months. These job tasks, knowledge, skills, and abilities are deemed appropriate for new graduates entering professional practice

(ASHA, 2017). The experts, who are nominated by ASHA to serve on Praxis committees, are ASHA-certified individuals who work with ETS to write questions.

The Praxis® Examination is used throughout the United States in the field of SLP as an objective measure that rates general knowledge across the various sub-specialties in the field. It is an "external" measure administered by the ETS, and all students completing a Master's degree in SLP must pass the Praxis® in order to obtain state licensure in California and national certification by ASHA. The Praxis® measures a wide range of topics within the field of SLP, and is accepted by ASHA as a metric for national certification. For that reason the Praxis® score was used as the dependent variable in this study. The research question became: what variables predict SLP graduate student success (i.e., Praxis® score) in graduate school?

Each applicant to the SLP program at University of the Pacific provides the following information, all of which are evaluated by eight faculty members: GRE scores; grades for the most recent 60 semester units; three letters of recommendation; and a personal essay.

Students at University of the Pacific enter as 15-month students (from time of admission to graduation) if they enter with an undergraduate major in the field, or as 24-month students if they complete a baccalaureate degree in a different field. Both groups must have passed specific general education courses (e.g., statistics, physics—see Table 2). The 15-month students have completed a core of eight undergraduate courses in SLP, and the specified list of general education courses. The 24-month students complete the core of eight SLP courses during their 24-month curriculum. The knowledge and skills accounted for by the above curriculum are dictated by ASHA.

Method

The data collected on all students in cohorts from 2010 through 2015 yielded a sample of 136 students with complete data. The Communication Sciences and Disorders Centralized Application Service (CSDCAS), a service owned by Liaison International™, collected transcripts, which were verified for authenticity. In addition, CSDCAS collected all supporting documentation (e.g., letters of intent, letters of recommendation, etc.). The independent variables were as follows: a) Grades in each of 13 courses (see Table 2), b) Graduate Record Examination (GRE) Verbal, Quantitative, and Analytic Writing scores, and c) three letters of recommendation. These 19 variables were entered into a regression model to determine whether they predicted the outcome variable, which was each student's score on the Praxis® test).

Of the 136 participants, all achieved a passing score on the Praxis®, with a mean of 181 (range 147.5-200; standard deviation 9.43). One hundred percent were employed at the time of graduation.

Table 2. Courses required by the American Speech-Language-Hearing Association.

Physics*
Biological Sciences*
Psychology or Sociology*
Statistics*
Human Development Across the Lifespan*

Phonetics
Speech and Language Development
Speech Sound Development
Anatomy and Physiology of the Speech Mechanism
Speech and Language Disorders
Audiology
Speech and Hearing Science
Diagnostics

*These courses are outside the SLP major

Statistical Analysis. A regression model, using the Statistical Package for the Social Sciences (SPSS) considered the following three types of independent variables: grades (13); GRE scores (3); and letters of recommendation (3), for a total of 19 independent variables. A minimum sample size of five for each independent variable is recommended for multiple regression analysis (Bartlett, Kotrlik, & Higgins, 2001). With 19 independent variables, a sample size of 95 or more would thus be appropriate for the current study. Therefore, an N of 136 was appropriate for analysis in this study. The dependent variable was the Praxis® score. Stepwise multiple regression was used, with each variable being entered into the regression model on the condition that it contributed significantly ($p<.05$) to the prediction of the outcome variable, Praxis® score. At that point in the process the model was analyzed, and any variable that did not meet the criterion ($p<.05$) for staying in the model was removed. This process continued until there were no longer any predictor variables that met the criterion for entering into the model or for removal from the model.

Results

The regression model that best predicted graduate school success was the GRE verbal score, the GRE quantitative score, and the grade in the speech and language development course ($p=.004$). The R^2 value of this model was .260, a moderate value. Thus, 26% of the variability in graduate school outcome could be explained with these three combined variables. The sample for this study included 104 applicants eligible for the 15-month program (i.e., who had completed the eight core courses listed in Table 2 prior to admission) and 32 applicants eligible for the 24-month program. Because those sample sizes were inadequate separately for the current analysis, regression analysis was not conducted while accounting for that potential confound. However, a t-test for Praxis scores between the two groups revealed no significant differences ($F = 1.53$; $p = .22$).

Discussion

Every year graduate programs analyze information on applicants to graduate programs to decide who to accept into the field of study. Transcripts are scrutinized, standardized records are compared, and letters of recommendation are read. Yet, evidence that these analyses are predictive of successful outcomes by these applicants has been lacking.

A reasonable question, then, is what metric to use for success. In the studies reviewed here (Dunlap, et al., 1998; Forrest & Naremore, 1998; Halberstam & Redstone, 2005; Newton & Moore, 2007), the graduate grade point average was used as this metric. Two issues exist related to the use of graduate GPAs. The first is the lack of variability in graduate grades. The range of grades is

simply small. The second is that faculty members, with the best of intentions, can be biased when assigning graduate grades, especially when they are aware of the student's performance as an undergraduate. About 1/3 of the participants in this study had completed their undergraduate program at University of the Pacific, and thus were being graded in their graduate program only 1-3 semesters later. This study used those undergraduate grades as predictor variables on an external objective test conducted on a national level.

The results of the current study are consistent with those of Halberstam and Redstone (2005) and Forrest and Naremore (1998), although this author found more specificity within the GRE scores and within the grade point average. Specifically, the Verbal and Quantitative scores of the GRE, and the grades on the speech and language development course, when combined, were significantly predictive of graduate school success.

The selection criteria differ across graduate programs even within the field of SLP. An informal poll by this author of graduate programs revealed a wide range of comfort levels with the criteria used by the program directors of the respective programs—from a reluctance to even explore the issue to a fairly constant "tinkering" with the process. This study reports on a systematic examination of the topic.

Limitations

With a predictive value of 26%, clearly other variables contribute to graduate school success beyond the 19 variables included here. For example, letters of recommendation were conveniently rated on a 1-3 scale because the writers of the letters had been required to use that scale when they submitted them to CSDCAS. However, a more detailed rubric for scoring these could have been used. Similarly, the video introduction of applicants used by University of the Pacific could also be rated. A nearly infinite number of variables could be considered, of course. As noted, studies have included undergraduate grade point average (Darolia, et al., 2014; Dunlap, et al., 1998; Forrest & Naremore, 1998; Graham, 1991; Halberstam & Redstone, 2005; Newton & Moore, 2007), GRE scores (Darolia, et al., 2014; Dunlap, et al., 1998; Forrest & Naremore, 1998; Newton & Moore, 2007), but also variables such as ethnicity (Dunlap, et al., 1998; Graham, 1991), age (Dunlap, et al., 1998; Graham, 1998; Halberstam & Redstone, 2005), and degree of prior experience in the relevant field (Darolia, et al., 2014; Dunlap, et al., 1998). An infinite number of independent variables could be included, of course; however, the only ones that have been determined predictive of graduate school success have been undergraduate GPA (Darolia, et al., 2014; Dunlap, et al. 1998; Forrest & Naremore, 1998; Graham, 1991; Halberstam & Redstone, 2005; Newton & Moore, 2007) and comprehensive examinations (Dunlap, et al., 1998). One exception to this was the work of Halberstam and Redstone (2005), who determined that undergraduate GPA, core courses in SLP, letters of recommendation, and letters of intent each predicted graduate GPA.

Another important aspect of the current study is the use of the Praxis as the dependent variable. None of the studies reviewed used the Praxis as the criterion for defining success (i.e., as a dependent variable). Students often report test anxiety in preparing for and actually taking the Praxis exam. This is in contrast to the independent variables, which represent performance over

time and hence reduced anxiety, as the performance represents multiple opportunities to demonstrate competence.

Related to the concern about the Praxis as a "moment-in-time" assessment is the more general issue of defining success. The scope of this study was limited to a definition of student success. That is, it did not include how successful these individuals would be in clinical practice once they had completed their degrees. Although that issue is certainly worthy of study, it was beyond the scope of the current study. Defining success in that manner would extend the responsibility for such success beyond the graduate program to future employers, the particular strengths and weaknesses of individual students, the interaction of the graduates with future clients, etc.

Another limitation could be the GRE test. Unlike the grades earned as a result of a semester of work, the GRE is, like the Praxis, a "moment–in-time" test. Those who are good test-takers might be inclined to do well on both measures. This was, of course, part of the rationale for choosing multiple independent variables in the first place.

Further study is warranted to examine the test-taking phenomenon. For example, devising a measure of student aptitude that accounts for clinical skills (i.e., skills acquired over time) in addition to the Praxis could arguably provide a better-rounded picture. The current study represents a step in the process of determining success in graduate school. This author has begun the process for further study of this matter by including measures of clinical performance during graduate school. However, the current study can provide a basis for understanding the factors that might predict a successful graduate school experience for those entering the field, and give admissions committees useful information.

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