ADMISSION CRITERIA FOR EDUCATIONAL LEADERSHIP DOCTORAL STUDENTS IN ONE U.S. DOCTORAL PROGRAM

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ABSTRACT

Aim/Purpose	The purpose of this study was to explore relationships between preadmission criteria and doctoral student performance ratings and to develop a model to predict student persistence in one doctoral program of educational leadership.
Background	Individuals responsible for program admission decisions have a responsibility to minimize bias in the candidate selection process. Despite an interest in doctoral degree completion, few researchers have examined preadmission criteria and the ability to predict doctoral student performance, particularly in education programs.
Methodology	Preadmission variables and postacceptance performance ratings were used in this cross-sectional predictive study (Type 5; Johnson, 2001) of 102 doctoral students in one educational leadership program. Analyses included descriptive statistics, a Pearson r correlation matrix, and predictive discriminant analysis.
Contribution	In addition to strengthening the extant literature base, we attempted to respond to the charge levied by other researchers for faculty members in educational preparation programs to reassess current practices used to recruit and retain students.
Findings	Using predictive discriminant analysis, we determined that separate models for students of color and White students most accurately predicted program performance, indicating that a one-size fits all approach was not optimal. The GRE-Q and undergraduate GPA were useful predictors of doctoral student

	persistence. Additionally, the GRE-V and graduate GPA were also useful predictors but differentially so for students of color and White students.
Recommendations for Practitioners	We found value in using the GPA and GRE in admission decisions with some modifications. Programs directors are advised to evaluate their own selection processes to understand the utility of their preadmission criteria.
Recommendations for Researchers	Although the functions that worked best in predicting continuance were grouped by ethnicity in this study for our students, future researchers might consider disaggregation by gender or some other characteristic to optimally identify a model specific to the student groups represented in their sample.
Impact on Society	Working from an activist stance, we use our awareness of the positive correlation between degree attainment and socio-economic mobility in the United States, coupled with the existing realities of students of color who seek access to a space within the dominant culture, to urge admission committees to evaluate closely the variables used in their admission selection and to understand to what extent the selection process results in a fair selection across student groups.
Future Research	Future studies could be conducted to understand why these differences exist. Other variables for future researchers to consider include time since the candidates obtained their master's and bachelor's degrees, the length of time to obtain those degrees, and the type of degree obtained.
Keywords	doctoral students, educational leadership, admission, selection, Graduate Record Examination (GRE), grade point average (GPA)

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Doctoral student attrition at institutions of higher education has been a documented concern for many years (Jairam & Kahl, 2012). Other researchers have indicated that nearly 50% of the students who enroll in doctoral programs will not complete them (Ali & Kohun, 2007; Council of Graduate Schools, 2010; Young, 2005). Consequently, a disproportionate volume of research specific to doctoral programs focuses on the aftermath of student admissions rather than preadmission variables (Hoyle, 2007; Kiley, 2011; Marrero, 2016). Despite an interest in doctoral degree completion, only a few researchers have examined the role of the preadmission processes in doctoral education (e.g., Kuncel, Wee, Serafin, & Hezlett, 2010; Marrero, 2016; Rockinson-Szapkiw, Bray, & Spaulding, 2014; Young, 2008). Although approximately 3,000 students of educational leadership doctoral programs graduate each year, little is known about preadmission criteria and the ability to predict doctoral student performance, particularly in education programs (Knapp, Kelly-Reid, & Ginder, 2011). In addition to strengthening the extant literature base, we attempted to respond to the charge levied by other researchers for faculty members in educational preparation programs to reassess current practices used to recruit and retain students (Tucker & Uline, 2015). Therefore, the purpose of the present study was twofold: (a) to explore relationships between preadmission criteria and student performance ratings and (b) to develop a model to predict student persistence in a doctoral program of educational leadership.

REVIEW OF LITERATURE

Doctoral programs in educational leadership, including the EdD and PhD programs, have similar requirements for admission. Candidates are asked to submit transcripts of undergraduate and gradu-

ate coursework, written statements, reference letters or recommendations, and standardized test scores. Program faculty review candidate documents and might require interviews, presentations, or written performance tasks. In a national survey of educational leadership doctoral programs, Tucker and Uline (2015) reported practices for candidate selection. The Graduate Record Examination (GRE) was the most commonly used assessment for admissions. PhD programs used the GRE more frequently than EdD programs (86% vs. 67%; Tucker & Uline, 2015). Ten percent of educational leadership programs required the Miller Analogies Test (Tucker & Uline, 2015). Some programs did not require any exams for admissions including 21% of EdD programs and 14% of PhD programs (Tucker & Uline, 2015). Noting the absence of studies for educational leadership programs, Tucker and Uline (2015) recommended further research on the predictive validity of preadmission criteria for academic and leadership potential of candidates.

The use of previous academic success as measured by grade point average (GPA) is a common variable in selection processes for doctoral students (Tucker & Uline, 2015). When applying to doctoral programs, candidates are asked to provide official transcripts of undergraduate and graduate coursework. The GPA for each degree is considered as an admission criterion. Educational leadership doctoral programs reported a range of required minimum GPAs for admission, with the mean undergraduate GPA at 2.88 and graduate GPA ranging from 3.0 to 3.5 (National Council of Professors of Educational Administration, 2008). Using a linear model, Young (2005) concluded that the graduate GPA was more accurate than the undergraduate GPA when measuring past academic performance, possibly due to maturation, and the graduate GPA was a more predictive criterion for student success in an educational leadership doctoral program. In another study, Young (2008) examined undergraduate GPA, graduate GPA, and GRE scores from a sample of applicants in a doctoral program in educational leadership. Descriptive discriminant analysis was used to determine differences among three groups: rejected applicants, accepted students, and graduated students. Results indicated that the graduate GPA and the GRE-V score were helpful in characterizing those who were admitted or rejected from the program; however, these indicators were less helpful in distinguishing those admitted from those who graduated. Young (2008) concluded that programs should use a variety of criteria and that "each predictor should be assessed relative to predictive validity" (p. 20).

Focused on one doctoral psychology program at a Hispanic Serving Institution, Marrero (2016) compared admission variables with graduation status of 81 students. Students with higher GPAs and part-time employment were more likely to graduate. Similarly, King, Beehr, and King (1986) analyzed the preadmission data from 239 applicants in one doctoral psychology program and concluded that GPAs, GRE-V, and GRE total scores were related to positive faculty ratings of students' academic abilities. In contrast, Wilkerson (2007) examined students in a physics doctoral program and noted no relationship between student persistence or completion and GPAs. Reviewing data from 300 candidates in one EdD program in educational leadership, Mountford, Ehlert, Machell, and Cockrell (2007) concluded that previous school achievement as measured by the undergraduate GPA was slightly related to the doctoral students' comprehensive exam scores. Time to program completion was not related to any of the admission variables (Mountford et al., 2007). The authors suggested that programs find alternatives to the use of traditional variables in selection and use "processes that are socially just and encourage students, regardless of race, to communicate to screening committees their potential to lead educational organizations" (Mountford et al., 2007, p. 208).

Many doctoral programs in educational leadership require the GRE or Miller Analogies Test for admissions (Tucker & Uline, 2015). Multiple researchers have examined the predictive ability of the GRE in admissions of doctoral students (Kuncel et al., 2010; Mountford et al., 2007). In a meta-analysis of about 100 studies, Kuncel et al. (2010) examined the predictive ability of GRE scores for master's and doctoral students. The GRE scores predicted first-year GPA and faculty ratings, and the researchers recommended that "the GRE is a useful decision-making tool for both master's- and doctoral-level programs" (Kuncel et al., 2010, p. 350). Similarly, Wao and Onwuegbuzie (2011) noted a positive association with a graduate GPA and GRE-Q score and a doctoral student's time to com-

pletion. Opposed to heavy reliance on admission test scores and GPAs in determining student selection in educational leadership programs, Painter (2003) highlighted a more "distributive" approach to for admissions (p. 203). From a distributive perspective, Painter (2003) advocated for the use of applicants' leadership qualities and potential rather than individual test scores. Similarly, King et al. (1986) analyzed the preadmission data from 239 applicants in one doctoral psychology program and concluded that GPAs, GRE-V, and GRE total scores were related to positive faculty ratings of students' academic abilities. In contrast, Wilkerson (2007) examined students in a physics doctoral program and found no relationship between student persistence or completion and GRE scores.

Regarding the use of the Miller Analogies Test in educational leadership doctoral programs, Young and Young (2010) compared admission decisions of doctoral applicants in one educational leadership program by gender and national origin. The authors used existing data from 100 applicants over a 14-year period. The authors noted differences in admission decisions among candidates of different national origins were due mainly to the Miller Analogies Test score. Having a lower Miller Analogies Test score increased the chances of being rejected for doctoral admission. Young and Young (2010) concluded that African Americans and Asians were less likely to be admitted to a doctoral program because of their Miller Analogies Test scores. They recommended that caution be used in the admission process when overemphasis is given to one test score. Young and Young (2010) recommended less weight be given to Miller Analogies Test score and more weight be given to GPA for Asian and African Americans to lessen the potential "loss of talent" (p. 49) because GPA can cover more years of experience than one test score. In an earlier study, Young (2007) collected admissions data (e.g., GPA, Miller Analogies Test) over a period of 10 years for 102 applicants to one educational leadership doctoral program and compared the data to admission decision and graduation status. The Miller Analogies Test had the most influence in predicting student admission. Individuals who excelled on standardized tests "were more likely to be admitted and more likely to graduate than those performing less well on these measures" (Young, 2007, p. 52). However, some who were admitted and some who graduated had lower scores than some who were denied admission. Young (2007) concluded that these results "illustrate that all selection procedures are prone to errors" (p. 52).

Although researchers have concluded that traditional measures (e.g., GRE, GPA) for admission are inadequate, most programs still use these measures and give them the most weight (Mountford et al., 2007). Professional reference forms at the graduate level completed by a candidate's previous instructors have been seen as a reliable method to gauge a candidate's academic and research potential (Marrero, 2016). In a study with 81 doctoral students in a psychology program, Marrero (2016) noted a statistically significant difference between students' ratings on recommendation forms and their completion status. In this study, the recommendation letter asked the rater to evaluate the candidate's ability on indicators such as academic performance, collaboration, commitment, writing ability, and research potential. Regarding the contents of the recommendation form, Kuncel, Kochevar, and Ones (2014) suggested that programs assess indicators related to academic coursework, persistence, and motivation because these areas are related to program completion. Young (2005) used logistic regression analysis to ascertain the extent to which the nine areas on 306 applicants' professional reference forms contributed to doctoral faculty's decisions to accept or deny admission. Young (2005) revealed research abilities and work habits predicted those who were admitted to this one educational leadership doctoral program. Thus, Young (2005) encouraged doctoral program administrators to assess applicants' research abilities and work habits in the selection process.

Mountford et al. (2007) reviewed several other screening devices and concluded interviews, writing samples, and problem-solving activities were more accurate predictors of performance in educational leadership doctoral programs than the GRE or GPAs. Childers and Rye (1987) concluded that a multidimensional approach (e.g., essay activity, structured interviews, small group activities), although time consuming, provided faculty members with a greater chance of selecting students who would complete the degree and afforded students with lower cognitive measures (e.g., GPA, GRE scores) to showcase intangible strengths. For educational leadership programs, Tucker and Uline (2015) rec-

ommended that faculty use a variety of assessment strategies such as demonstrated leadership strengths, portfolios, and leadership assessments.

Regarding selection processes and the doctoral degree in educational leadership, few recent studies were located (e.g., Mountford et al., 2007; Rockinson-Szapkiw et al., 2014; Tucker & Uline, 2015; Young, 2007, 2008, 2010). Addressing the importance of doctoral selection in educational leadership, Young (2008) noted that "only scant empirical information exists for guiding the decision making of faculty within the context of doctoral programs focusing specifically on educational leadership" (p. 3). Although the predictive ability of preadmission variables for doctoral programs has been debated across other disciplines (e.g., Childers & Rye, 1987; King et al., 1986; Kuncel, Hezlett, & Ones, 2001; Kuncel et al., 2010; Marrero, 2016; Wao, 2010; Wao & Onwuegbuzie, 2011; Wilkerson, 2007), more information is needed about selection in educational leadership programs.

METHOD

DESCRIPTION OF DOCTORAL PROGRAM AND SELECTION PROCESS

This study was conducted at a regional university located in the southern region of the United States. The doctoral program applicant pool at the study institution consisted of educators and administrators employed full-time in rural or urban academic settings. Doctoral program members, specializing in higher education or K-12 leadership, followed a cohort model where students enroll in core courses with the same group of peers throughout the completion of the 60-semester-credit hour program. The doctoral degree is awarded to those students who successfully complete the required coursework, demonstrate mastery on comprehensive examinations, and successfully defend their dissertation.

Students were invited to apply twice a year, during the fall and spring semesters. As illustrated in Figure 1, entry into the doctoral program follows two phases. Phase 1 involved prescreening applicants' credentials (i.e., GRE, undergraduate GPA, graduate GPA) and leadership experiences. Leadership experience was determined by evaluating applicants' professional resumes and written personal statements. At the close of Phase 1, committee members rated applicants' credentials and leadership experience using a scale ranging from 1 (very low) to 5 (very high). Selected students were then invited to participate in Phase 2 of the selection process.

Phase 2 consisted of evaluating applicants' communication and research skills. Applicants' written communication was evaluated through submission of a personal statement essay and scholarly writing sample. Verbal and nonverbal skills were noted during the face-to-face interview session and research presentation. Together, the phases were intended to give the selection committee a comprehensive impression of applicants' abilities to complete the doctoral program. Ratings from Phases 1 and 2 were combined to rank order applicants from 1 (lowest) to 5 (highest). This overall applicant selection rating was used by the committee as they deliberated final admission decisions. Committee members typically selected six to 12 individuals to offer admittance into the doctoral program.

Study participants

All students entering the program in Spring 2010 through Summer 2013 were included in this cross-sectional predictive study (Type 5; Johnson, 2001). Of the 102 participants, 29% ($n = 30$) were male and 71% ($n = 72$) female. The average student age was 42 ($SD = 10$). In terms of ethnic group membership, 61% ($n = 62$) identified as White, 23% ($n = 23$) identified as Black, 14% ($n = 14$) identified as Hispanic, and 2% identified as other ($n = 3$). The majority of the students were members of a K-12 educational leadership cohort, 60% ($n = 61$), and the remainder were members of a higher education leadership cohort 40% ($n = 41$). Due to the small number of students representing each ethnic category, for analysis purposes, participants were sorted into two groups (i.e., White students and students of color).
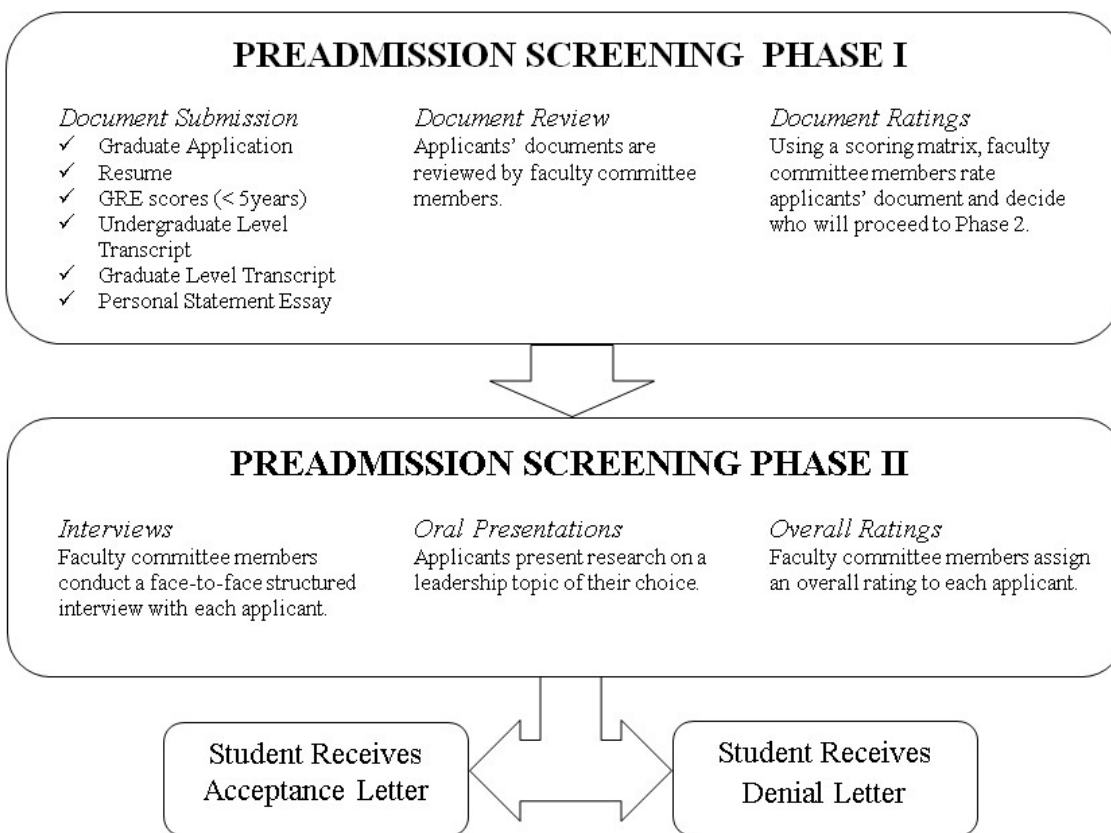
PREADMISSION SCREENING PHASE I

Document Submission
- ✓ Graduate Application
- ✓ Resume
- ✓ GRE scores (< 5years)
- ✓ Undergraduate Level Transcript
- ✓ Graduate Level Transcript
- ✓ Personal Statement Essay

Document Review
Applicants' documents are reviewed by faculty committee members.

Document Ratings
Using a scoring matrix, faculty committee members rate applicants' document and decide who will proceed to Phase 2.

PREADMISSION SCREENING PHASE II

Interviews
Faculty committee members conduct a face-to-face structured interview with each applicant.

Oral Presentations
Applicants present research on a leadership topic of their choice.

Overall Ratings
Faculty committee members assign an overall rating to each applicant.

| Student Receives Acceptance Letter | Student Receives Denial Letter |

Figure 1. Doctoral student selection process

Variables

The submitted preadmission doctoral student academic criteria used in this study were students' GRE-V scores, GRE-Q scores, undergraduate GPA, and graduate GPA. In addition, two postacceptance doctoral student evaluation criteria were created for this study: overall student performance rating and academic writing performance rating. The overall student performance was gauged by a rating form provided to doctoral faculty members who had taught a majority of the students in at least one course. Faculty members were asked to rate the overall performance of the students they had taught with a holistic score ranging from 1 to 5. Faculty were instructed to assign a rank of 1 to students in the bottom 10th percentile, a rank of 2 to students whose overall performance was in the bottom 30th percentile, a rank of 3 to students whose overall performance was considered average (from the 31st to 59th percentile), a rank of 4 to students whose overall performance was in the top 30th percentile, and a rank of 5 to students whose overall performance was in the top 10th percentile.

Although all professors did not rate all students, there was sufficient overlap across raters so that scores could be adjusted per rater. In essence, we rescaled the scores by selecting one faculty member as the standard. All other faculty were adjusted to that standard. For example, a rater who tended to rate students higher had scores adjusted downward. Similarly, a rater who tended to rate students lower had scores adjusted upward. This scaling allowed for a more consistent interpretation of the scores. The students' academic writing performance was similarly ranked by the academic writing instructor who had taught all the students. Because a single instructor rated all students, another instructor randomly rated a select group of students a second time to ensure consistency in the scoring.

Analytical Strategy

Prior to analysis, descriptive statistics were reviewed for all variables. To explore the relationship between preadmission doctoral student academic criteria and postacceptance doctoral student evaluation criteria, a Pearson *r* correlation matrix was calculated. Determining the predictive ability of doctoral program admission criteria was addressed with predictive discriminant analysis (Huberty, 1994; Huberty & Barton, 1989). Predictive discriminant analysis, which uses linear classification functions (LCFs), is focused on group membership prediction. The variables used in the LCFs for this study were the preadmission doctoral student academic criterion variables. Standardized weights were applied to the standardized variables to obtain LCF scores.

RESULTS

Descriptive statistics and a correlation matrix for all students were observed prior to running the discriminant analysis. After running the discriminant analysis, it became evident that perhaps separate descriptive statistics and correlation matrices for both students of color and White students were in order. These statistics are depicted in Table 1. The disparity by ethnic group across every single indicator can be observed in the average value for academic preadmission criteria as well as postacceptance criteria. In the correlation matrix, although undergraduate GPA was not related to graduate GPA for students of color ($r = .08$, $p = .642$), undergraduate GPA was positively related to graduate GPA ($r = .28$, $p = .026$) for White students. And although GRE-Q was not statistically significantly related to GRE-V in White students ($r = .25$, $p = .052$), this relationship was statistically significantly related to students of color ($r = .32$, $p = .044$). Further, although estimates of the degree of association with postacceptance criteria were generally in the same direction across both student groups, the magnitude was larger for White students across multiple indicators: GRE-V with ProfAvg ($r_W = .27$, $p = .041$; $r_{SoC} = .24$, $p = .141$), GRE-Q with WritAvg ($r_W = .26$, $p = .038$; $r_{SoC} = .18$, $p = .268$), GGPA with ProfAvg ($r_W = .51$, $p < .001$; $r_{SoC} = .41$, $p = .008$), GGPA with WritAvg ($r_W = .47$, $p < .001$; $r_{SoC} = .42$, $p = .008$), and ProfAvg with WritAvg ($r_W = .80$, $p < .001$; $r_{SoC} = .69$, $p < .001$).

Table 1. Correlation matrix and descriptive statistics for study variables

MEASURE	PRE-ADMISSION					POST-ADMISSION	
	GREV	GREQ	UGPA	GGPA		PROFAVG	WRITAVG
GREv	--	.32*	-.01	.24		.24	.29
GREq	.25	--	-.10	.05		-.02	.18
UGPA	.28*	.06	--	.08		.11	.23
GGPA	.03	.05	.28*	--		.41**	.42**
ProfAvg	.27*	.16	.25	.51**		--	.69**
WritAvg	.28*	.26*	.19	.47**		.80**	--
M_{SoC}	147.41	141.05	3.09	3.70		3.58	2.72
SD_{SoC}	5.32	5.02	0.47	0.33		1.07	1.38
M_{White}	152.61	145.71	3.19	3.76		4.13	3.32
SD_{White}	5.76	6.00	0.46	0.27		1.11	1.35

*$p < .05$; **$p < .01$

Note. Pearson *r* correlation for students of color (upper off-diagonal matrix) and White students (bottom off-diagonal matrix). *GREv* = Graduate Record Examination Verbal, *GREq* = Graduate Record Examination

Quantitative, *UGPA* = Undergraduate Grade Point Average, *GGPA* = Graduate Grade Point Average, *ProfAvg* = Professors' Average, *WriAvg* = Writing Average. SoC = Students of Color. White = White students.

Predictive discriminant analysis was used to predict group membership based on preadmission criteria. This analytical model uses classification variables (i.e., predictors such as GRE and GPA) to designate each case as more likely to belong in one group (continue in program) versus the other group (dropout of program). Initially, a single model was used to classify the students into two predicted groups: continue group (i.e., those students who were most likely to continue in the doctoral program) and the dropout group (i.e., those students who were most likely to drop out of the doctoral program). However, we noted that a disproportionate number of students of color were falling into the range of scores predictive of the dropout group if the single classification model was applied, as shown in Figure 2. Although the degree of overlap between students who dropped out and students who did not drop out in White students was minimal, the degree of overlap between students who dropped out and students who did not drop out in students of color was substantial. Therefore, we adopted a separate model, one for the students of color and one for White students.
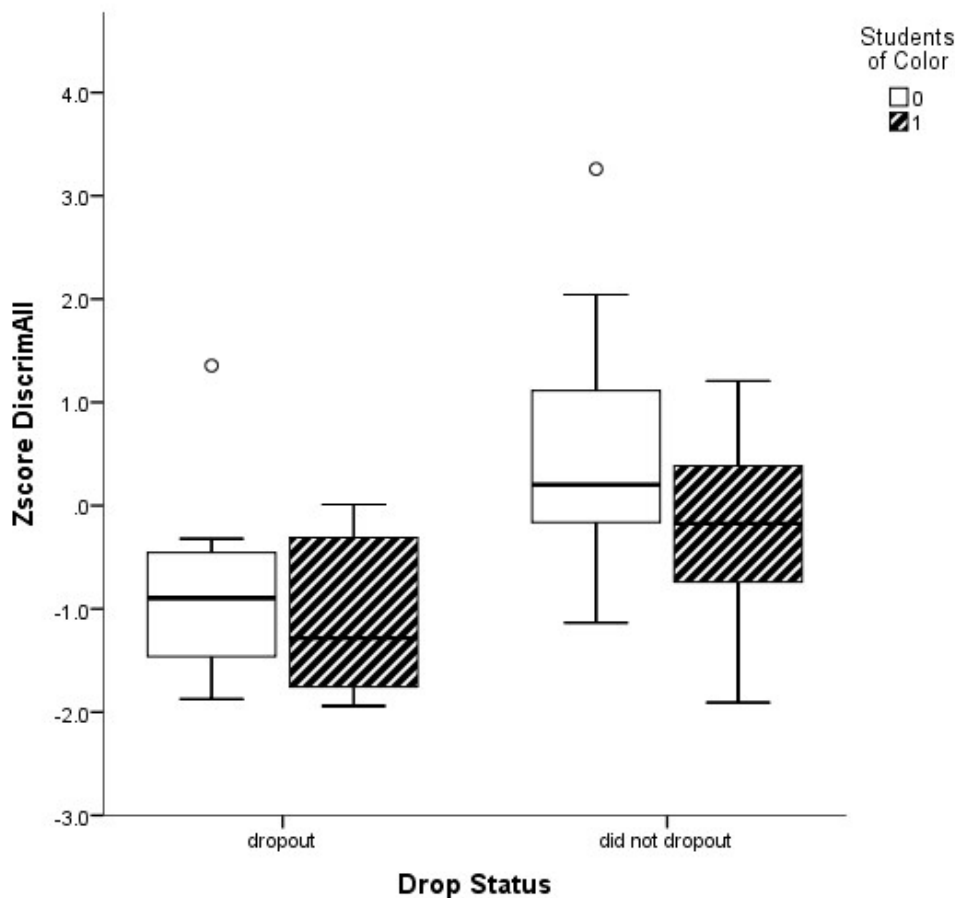

Figure 2. Box plot of the discriminant score by drop out status for overall model

Box's M test was not statistically significant for the student of color model ($p = .95$) or the White student model ($p = .25$), indicating that the equality of covariance matrices assumption was not violated. The resulting LCF scores calculated separately for each group were then used to rank order the students. Examination of box plots by dropout status for the single classification model (Figure 2) versus the separate models (Figure 3) demonstrated appreciable improvement in the classification of all students.
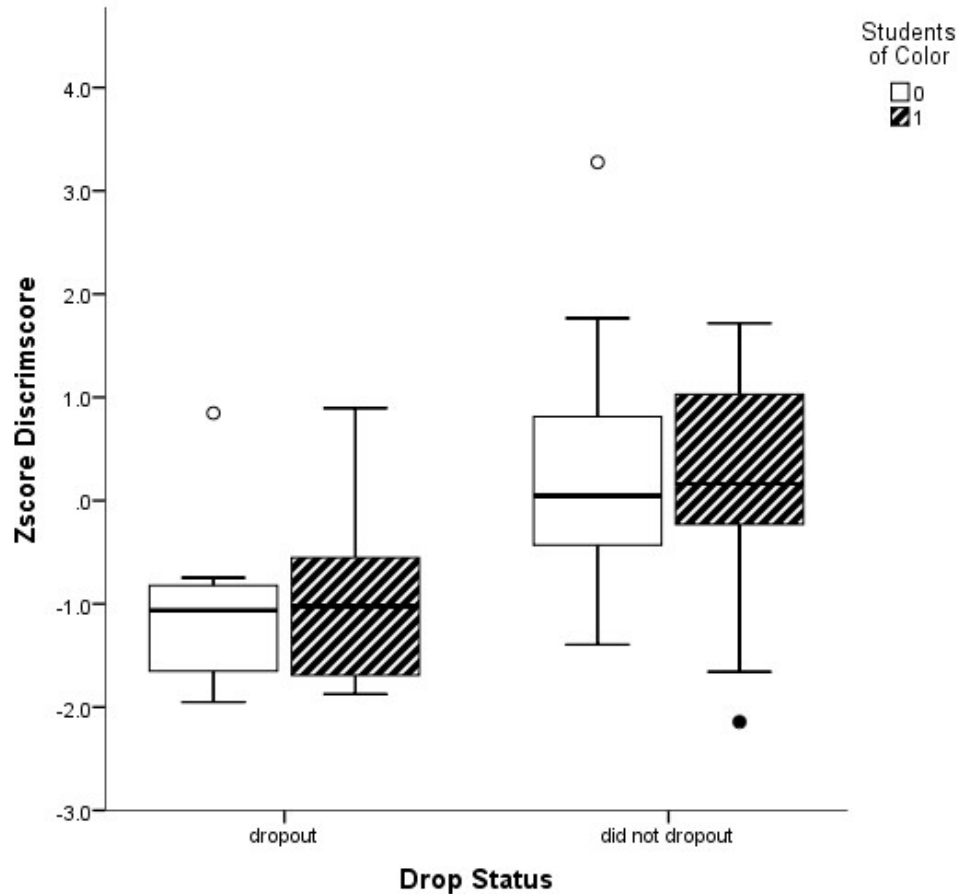
Figure 3. Box plot of the standardized discriminant scores by drop out status and model type

Equations providing the standardized weights used for the overall model (Equation 1), the students of color model (Equation 2), and the White students' model (Equation 3) are as follows:

DiscrimAll = -.028*zGRE-V + .739*zGRE-Q + .719*zUGPA - .033*zGGPA (1)

DiscrimSoC =.407*zGRE-V + .602*zGRE-Q + .724*zUGPA + .019*zGGPA (2)

DiscrimW = -.187*zGRE-V + .780*zGRE-Q + .753*zUGPA - .140*zGGPA   (3)

It is important to note that although the LCF scores themselves have no intuitive meaning, they can be used to rank order the students based on propensity to dropout or continue. In addition, these weights can be used with subsequent cohorts of students (Huberty, 1984).

Because our focus was to identify correctly those students most in danger of dropping out and those students most likely to complete the doctoral program, we adopted the following formula for estimating chance, $p_1a_1 + p_2a_2 + \ldots p_ka_k$, where p is the proportion of cases belonging to each group, a represents the proportion actually classified as belonging to that group and k is the number of groups. The resulting estimated chance for each model was then used to test for the difference between two proportions (Glass & Stanley, 1970). We found that model prediction was better than chance for both the student of color model ($z = 1.99, p = .02$) and the White student model ($z = 1.82, p = .03$).

Tables 2 and 3 provide the hit rates for the students of color and White students, respectively. The students of color model had an 82% hit rate or 31 out of 38 students were correctly classified as ei-

ther continuing in the program or dropping out of the program based on the LCF scores. The White student model had a hit rate of 76%, where 47 out of 62 students were correctly classified as either continuing in the program or dropping out of the program based on the LCF scores.

Table 2. Hit rates using a discriminant function to predict doctoral students of color's propensity to continue in the program

ACTUAL GROUP		PREDICTED GROUP		TOTAL
		CONTINUE	DROPOUT	
Continue				
	Count	26	6	32
	Percentage	81.25	18.75	84.21
Dropout				
	Count	1	5	6
	Percentage	16.67	83.33	15.79
Total				
	Count	27	11	38
	Percentage	71.05	28.95	

Note. A total of 31 hits, or 82% hit rate

Table 3. Hit rates using a discriminant function to predict White doctoral students' dropout propensity to continue in the program

ACTUAL GROUP		PREDICTED GROUP		TOTAL
		CONTINUE	DROPOUT	
Continue				
	Count	40	14	54
	Percentage	74.07	25.93	87.10
Dropout				
	Count	1	7	8
	Percentage	12.50	87.50	12.90
Total				
	Count	41	21	62
	Percentage	66.13	33.87	

Note. A total of 47 hits, or 76% hit rate

DISCUSSION

Few recent studies were located that addressed doctoral selection in educational leadership programs (e.g., Mountford et al., 2007; Tucker & Uline, 2015; Young & Young, 2010). Previous researchers

have noted the predictive ability of the GRE and GPA in doctoral admission decisions (Kuncel et al., 2010; Mountford et al., 2007; Tucker & Uline, 2015). Likewise, in our study, we found value in using the GPA and GRE in admission decisions with some modifications. Specifically, although our program used multiple indicators to evaluate prospective students (e.g., interviews, writings samples, references), the focus of the current study was on the utility of GPA and GRE as predictors of student persistence. In addition, we also explored the relationships between preadmission criteria and student performance ratings.

Based on the findings, we assert that a one-size-fits-all model for doctoral admissions might not be most effective in selection decisions. Evaluation of the descriptive statistics and the relationship among the variables directed attention to the disparity in the indicators across the student groups. To illustrate, consider a student who scores approximately a half a standard deviation above the mean, which translates into a GRE-V score of 154, a GRE-Q score of 147, an undergraduate GPA of 3.4, and a graduate GPA of 3.9, the LCF score would be .71 if weighted with the overall equation. In the overall equation (Equation 1), GRE-Q scores contribute the most to the overall LCF score, followed by undergraduate GPA, GRE-V, and graduate GPA. Note that the contribution of the GRE-V score and graduate GPA is negatively weighted.

If this student was a student of color, and instead we applied the student of color equation (Equation 2), the LCF score would be .89. The difference observed is understood in considering that in the student of color equation, undergraduate GPA is more heavily weighted, followed by GRE-Q score, GRE-V score, and graduate GPA. Moreover, the weight of the GRE-V score and the graduate GPA is positive now. What this difference indicates is that in the overall model, students of color were not getting enough credit for their undergraduate GPA, too much credit for their GRE-Q, and a negative weight instead of a positive weight for their GRE-V and graduate GPA.

For White students with these aforementioned preadmission indicators, the LCF score would be .61, and again, the difference is understood in view of the LCF weights (Equation 3). For White students, the GRE-Q score is most influential to the LCF weight, followed by undergraduate GPA, graduate GPA, and GRE-V. Again, a negative weight for the GRE-V score and graduate GPA is present. What this weighting indicates is that the function used to predict group membership for White students necessarily adjusted the GRE-V scores and the graduate GPA downwards and gave more weight to the GRE-Q and undergraduate GPA. If White students were evaluated with the student of color model, they would not get enough credit for their GRE-Q or undergraduate GPA and too much credit for their graduate GPA and GRE-V score.

These differences are best visualized by comparing Figure 2 and Figure 3. In Figure 2, all students' preadmission criteria were weighted with the overall model (Equation 1), which as discussed, does not adequately represent either group. If the cutoff score for selection was half a standard deviation below the mean (LCF = -0.5), then a disproportionate number of students of color who did not drop out would have been predicted to drop out in the model. In Figure 3, where each student group is weighted by weights specific to that group, and if the cutoff score for selection was half a standard deviation below the mean (LCF = -0.5), the inherent bias in using a single model is corrected. Additionally, the model is better able to identify correctly those students who dropped out of the program.

RECOMMENDATIONS FOR PRACTICE

Thus, returning to our intended purpose of understanding the utility of preadmission criteria in predicting student performance in a doctoral program of educational leadership, we offer these suggestions for practice. The GRE-Q and undergraduate GPA are useful predictors of doctoral student persistence. Additionally, the GRE-V and graduate GPA are also useful predictors but differentially so for students of color and White students. Because the LCF scores are a result of a weighting system that is optimized to the sample that is under consideration, it is critical that admission commit-

tees identify not only which predictors work best, but which predictors work best in light of the student groups represented in their applicant pools.

Working from an activist stance (Delgado & Stefancic, 2006), we use our awareness of the positive correlation between degree attainment and socio-economic mobility in the United States (U.S. Department of Treasury, 2012), coupled with the existing realities of students of color who seek access to a space within the dominant culture, to urge admission committees to evaluate closely the variables used in their admission selection and to understand to what extent the selection process results in a fair selection across student groups. Indeed, for our study sample, although we expect the same pre-admission criteria of all candidates, we recognize the primacy of undergraduate GPA and GRE-Q for all students, and more specifically for students of color, and we should further take into account their GRE-V. In doing so, we allow candidates to have a more equitable opportunity to demonstrate their propensity to successfully continue in our program, as supported by Mountford et al.'s (2007) call to create selection processes that are "socially just" (p. 208).

To believe that admission criteria are invariant across student characteristics is a dangerous assumption. As a reminder, the purpose of using preadmissions selection criteria is to select students for a limited number of positions and to predict who might be most likely to matriculate to doctoral candidacy. Arguably, it is equally unfair to admit a student who we know will likely not be successful in our program as it is to fail to admit a student who we believe would be successful in our program. As such, we prioritize accuracy in our admission decisions by gathering as much evidence as is feasible (Childers & Rye, 1987; Tucker & Uline, 2015). Although in this study for our students the weight functions that worked best in predicting continuance were grouped by ethnicity, in subsequent cohorts the distinction may be grouped by gender or some other characteristic.

CONCLUSION

There are multiple scenarios that could be explored in future studies to understand *why* these differences exist. For example, we did not consider the selectivity of undergraduate or master's schools, socioeconomic status, age, or other such indicators that might provide further insight into the disparity in the results. Other variables for future researchers to consider include time since the candidates obtained their master's and bachelor's degrees, the length of time it took them to obtain those degrees, and the type of degree obtained. But again, the impetus for creating separate models was not to identify variables that explained the disparity between students of color and White students. Rather, we created separate models because we became aware of the inability of a single model to predict adequately the propensity of students of color and White students to remain in the program. These models can help us to identify correctly candidates most in danger of dropping out and candidates most likely to complete the doctoral program. Supporting the conclusions of Griffin and Muñiz (2015) who examined graduate admissions and race, program leaders should continue to evaluate the predictive validity of preadmission criteria as a precursor to developing tomorrow's leaders.

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