

 GRAD AND PROFESSIONAL SCHOOLS

Applicant and Faculty Characteristics in the Doctoral Admission Process: An Experimental Vignette Study

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The purpose of this research was to examine whether decisions made at one stage of strategic and graduate enrollment management, the admission phase, depend on both applicant and faculty characteristics. Faculty participants (N=62) were randomly assigned to read one of four vignettes of a prospective applicant to their doctoral program. They then rated the likelihood that they would interview and admit the applicant, and they also completed other surveys. Participants' empathic orientation and first-generation college student status and higher Graduate Record Examination (GRE) scores were associated with more favorable admission decisions. Participant and applicant characteristics also interacted to predict admission decisions. The results have implications for strategic and graduate enrollment management professionals.

Diversity in higher education is related to enhanced problem-solving skills, positive student engagement and outcomes, and more robust intellectual contributions (Hurtado 2001; Hurtado and DeAngelo 2001; Valantine and Collins 2015). A number of studies have pointed to the need for diversity across the educational pipeline, including doctoral education, to ensure that universities are training the next generation of outstanding scholars and leaders (National Research Council 2011; Valantine, Lund, and Gammie 2016). Indeed, there have been significant increases in diversity in the doctoral student ranks, with increasing representation from un-

derrepresented groups (American Academy of Arts and Sciences 2015; Einaudi 2011). Yet some groups continue to be underrepresented in doctoral programs relative to their representation in the U.S. population (American Academy of Arts and Sciences 2015; Einaudi 2011; Valantine, Lund, and Gammie 2016). One reason for this finding is the loss of diverse talent at earlier stages in the educational pipeline due to lack of educational and academic opportunities to prepare students for graduate study (Valantine *et al.* 2016), socioeconomic challenges (Martinez, Sher, Krull, and Wood 2009), and/or cultural and psychosocial barriers (Steele 1997; Stephens, Fry-

burg *et al.* 2012; Stephens, Townsend *et al.* 2012). Strategic enrollment management efforts have attempted to address and improve student success by focusing on all stages of the student lifecycle in the context of the community, institution, and educational program (Dolence 1997; Sigler 2017). This strategy, as it pertains to graduate education, has been termed *graduate enrollment management* (GEM) (NAGAP 2017).

While all stages of the student lifecycle, from recruitment to alumni relations, are of interest to GEM professionals, a focus on the admission process may provide key insights for those who work in decentralized environments in which programs and faculty make admission decisions. In such environments, graduate admission review is a stage during which diversity in the doctoral applicant pool is lost (Miller and Stassun 2014; Posselt 2014). During initial review of applicant materials, some faculty members and programs inordinately weight standardized test scores (Miller and Stassun 2014) despite guidance from the Educational Testing Service (ETS) regarding the appropriate use of test scores (Educational Testing Service 2016a). In addition, some faculty members may inadvertently give preference to individuals whose applications mirror the faculty reviewer's own experiences, which often reflect higher socioeconomic status and privileged educational backgrounds (Posselt 2014). Such practices undermine efforts to enhance diversity, to create cohorts of students who can engage effectively with diverse populations, and to foster creativity. As noted by Posselt (2014), additional research is needed to identify the factors that may influence faculty members during the graduate admission process so that evidence-based recommendations can be made to improve the selection process. The purpose of the current study was to test the extent to which faculty members take into account two applicant characteristics—first-generation college student status and standardized test scores—when evaluating doctoral program applicants for admission. In addition, the extent to which characteristics of faculty members factored into these graduate admission decisions was considered.

Approximately 30 percent of school-age children in the United States have parents who earned a high school

diploma or less (National Center for Education Statistics, 2015), with higher rates among students from underrepresented minority groups (*e.g.*, 61 percent of those who are Hispanic/Latino; 50 percent of those who are Native Hawaiian/Pacific Islander; 42 percent of those who are American Indian/Alaskan Native; 41 percent of those who are black/African American). First-generation college students are less likely to aspire to graduate study (Carlton 2015), and they are two to four times less likely to pursue a doctoral degree (Cataldi *et al.* 2018; Choy 2001). In addition, their representation among students who earn doctorates has been decreasing steadily: first-generation college students earned approximately 30 percent of doctorates awarded in 1995 and fewer than 20 percent of doctorates awarded in 2015 (National Science Foundation 2017). These students share values and experiences—including a strong work ethic, community and teamwork, and the desire to give back to the community (Stephens, Fryberg *et al.* 2012; Stephens, Townsend *et al.* 2012)—that may contribute greatly to diversity in doctoral programs and, ultimately, to graduate student success. Unfortunately, very little is known about potential implicit bias facing this group of applicants during the doctoral admission process. Implicit bias is typically defined as an unconscious judgment that reflects stereotypes and prejudices about people based on their group membership (Greenwald and Banaji 1995).¹ Research has shown that hiring decisions in academia and industry are often subject to implicit (or unconscious) biases toward people from marginalized groups (Corrice 2009; Milkman, Akinola, and Chugh 2015; Moss-Racusin, Dovidio, Brescoli, Graham, and Handelsman 2012). An aim of the current study is to investigate potential bias toward first-generation college students during the doctoral admissions process using an experimental vignette design in which first-generation status is manipulated along with standardized test score performance.

Most graduate programs require applicants to submit materials such as a personal statement, letters of recommendation, transcripts, and standardized test scores (*e.g.*, Graduate Record Examination (GRE) scores). Some

¹ See also <implicit.harvard.edu/implicit/faqs.html>.

programs use the GRE to make an initial selection of top applicants (Posselt 2014), a practice that is contrary to the guidelines put forth by the Educational Testing Service (Educational Testing Service 2016a). This practice persists for a variety of reasons, including research demonstrating the predictive validity of the GRE (Kuncel, Hezlett, and Ones 2001) as well as limited faculty time to review the entire applicant pool and values regarding the definition of merit (Posselt 2014). As shown by several investigators, weighting the GRE more than other materials or even making initial selections on the basis of standardized test scores can severely limit the diversity of the applicant pool; it is well-established that on average, women and underrepresented minorities earn lower scores than do white male test takers (Educational Testing Service 2016b; Miller and Stassun 2014; Smith and Garrison 2005; Vasquez and Jones 2006). On average, first-generation college students also earn lower scores on the GRE than do students whose parents earned college degrees (Educational Testing Service 2016b). Because GRE scores continue to be used by many programs to select a shortlist of applicants, it is essential that they, along with first-generation status, be identified as a factor that may affect admission committee members' decisions.

Appraisals of applicants are likely to be influenced not only by the materials they submit but also by faculty members' personal characteristics and tendencies. For instance, intergroup bias theory (Hewstone, Rubin, and Willis 2002) posits that people have more favorable appraisals toward members of their own "in group." Extending this to graduate admission, faculty members whose parents did not attend college might view a candidate with a similar background more favorably than might faculty members who do not share this background. Research has also been conducted on the role of an empathic orientation in altruistic decision making (Batson, Early, and Salvarani, 1997; Batson, Eklund, Chermok, Hoyt, and Ortiz 2007). Taking another person's perspective predicts empathic concern (*i.e.*, feeling for another person in distress), and both these tendencies may have independent effects on altruistic and prosocial behavior toward others (Batson *et al.* 2007; Davis 2015). Perspective taking and empathic concern may in-

crease the likelihood that faculty members will consider applicants in a more favorable light, especially if the applicants are from a potentially marginalized group, such as first-generation college students. In contrast, beliefs can also constrain empathy and decrease the likelihood of a favorable decision. For instance, strong beliefs in meritocracy (*i.e.*, "hard work always results in success"; Ledgerwood, Mandisodza, Jost, and Pohl 2011) may hinder a faculty member's ability to empathize with an applicant because the faculty member may not account for situational factors (such as the need to work part or full time and adjust to a different psychosocial, cultural, and academic environment) that may have hindered undergraduate success (Bui 2002; Martinez *et al.* 2009; Stephens, Townsend *et al.* 2012). Thus, it is possible that faculty members' first-generation status and empathic orientation may have direct effects on their admission decisions as well as synergistic effects with applicants' first-generation status and GRE scores.

The current study examines the admission decision-making process as one key stage during which the diversity of the applicant pool can be adversely affected, thus affecting the representation of different groups in the enrolled doctoral student body. This study employed an experimental design to test the extent to which first-generation college student status as well as faculty member characteristics affect graduate admission decisions. Specifically, four vignettes of a hypothetical candidate for a doctoral program were created in which first-generation college student status (mentioned or not mentioned) and GRE score (mid-level and high) were manipulated. All other information about the applicant, including research and work experience, undergraduate grade point average, and interest in the program, were identical. Faculty participants were randomly assigned to read one vignette and then to answer questions about the applicant and themselves. It was expected that faculty members would report higher likelihoods of extending an interview or offer of admission when presented with vignettes that cited higher GRE scores and vignettes with no mention of first-generation status. It was also expected that faculty's first-generation status, empathy, and meritocratic beliefs would relate to

admission decisions. In particular, it was expected that first-generation faculty members would be more likely to make favorable admission decisions for first-generation applicants and for perspective taking and empathic concern to relate to more favorable admission decisions. In contrast, it was predicted that a stronger belief in meritocracy would be related to less favorable admission decisions. The possibility that vignette and faculty member personal characteristics would interact with each other in predicting admission decisions was also explored. Finally, through open-ended responses, the types of additional information that faculty members requested about applicants were explored in order to gain insights into faculty members' thought processes during review of the vignettes.

Method

Procedure

This study was approved by the Institutional Review Board at the researcher's university. Faculty members at a Carnegie-classified "highest research activity" doctoral university in the midwest United States participated in this study. Faculty members were recruited via posts to the university's online human resource management tool and through e-mails to department chairs and graduate directors. They were told that the purpose of the study was to better understand the decision-making processes of faculty during the doctoral admission process. Interested faculty members were directed to a link to an online survey.

After reading an online information sheet, participants were randomly assigned to receive one of four possible vignettes about a student who was applying for admission to their doctoral program. The only details that varied were first-generation status and GRE scores (a 2 [first-generation status vs. no mention of that status] X 2 [mediocre test scores vs. high test scores] design). Participants then read the assigned vignette (see below) and answered several questions regarding the applicant and themselves. Participants did not receive compensation for their participation.

Vignette

The following vignette was presented to participants:

Joe is an undergraduate in his senior year at a large public university who has applied to your doctoral program. Joe indicated in his personal statement that he is pursuing graduate studies to prepare to be a professor and researcher. Joe identified you as a potential advisor because he is interested in your program of study. It is clear from his personal statement that he has read several recent articles of yours and appears to understand the importance of the work presented in them. To prepare himself for this career, Joe has taken the necessary prerequisite coursework for the doctoral program. In college, Joe volunteered as a research assistant for a faculty member for one year. During this experience, he learned how to collect and enter data into Excel and SPSS, conducted descriptive analyses, and participated in weekly lab meetings with the professor, graduate students, and several other undergraduates. He noted that this experience was beneficial in helping him to recognize that he could pursue a career in scholarly research (first-generation prompt: especially given that he was the first in his family to attend college). Joe also noted in his statement that he volunteered at a social service organization once per week. Joe wrote that his research and volunteer experiences helped him develop skills to work effectively on his own and in a team. Joe also mentioned that he has learned good organizational and leadership skills by working a part-time job at a dining hall on campus during which he was able to work his way up the ranks from server to manager.

Participants were also presented with a table of the applicant's scores (see Table 1). A relatively low first-year GPA (approximately B-) rising to a GPA just shy of a B+ was chosen as an indication that the applicant worked to increase his overall GPA. GRE scores for the two conditions were selected to ensure variability in admission decisions.

Measures

Participants were asked to rate the likelihood on a scale of 0 to 100 percent of making each of three decisions

for the applicant, in this order: interview, admission, and funding (“Based on the information provided, how likely are you to invite Joe for an interview/admit Joe to your program/provide Joe with a fellowship or graduate assistantship for his first year of the program?”). After each decision, participants were asked if they would request additional details about the applicant (“What, if any, additional information would you like to know about Joe or his application to make a decision to *interview/admit/make a decision to fund* him?”). Likelihood of funding was not analyzed because there was a great deal of missing data for this variable. Participants noted that they do not make funding decisions and so were not able to provide a rating or that they only admit students they would fund. Thus, this variable was not analyzed further. It was possible that participants could go back and edit an earlier decision question after responding to the later decision question. If they did, it is also possible that reflecting on a later decision (*e.g.*, funding) may have affected an earlier decision (*e.g.*, interview or admission). However, no data are available to identify whether earlier responses were changed retroactively.

Sixty-six percent and 74 percent of participants indicated that they would have requested more information about Joe to make a decision to interview or admit him, respectively. The responses were reviewed by the first author to identify a preliminary set of categories. Faculty asked for the following information: (1) reasons for low GPA, (2) reasons for GRE score, (3) applicant’s interest in the program of study, (4) transcript or particular course grades, (5) information about research or technical skills, (6) communication skills, including writing skills, (7) personal qualities, (8) letters of recommendation, (9) demographic information, (10) other information (*e.g.*, financial need). Two raters who were blind to the vignette randomization then coded each response using these categories. Correcting for chance, inter-rater agreement for open-ended interview and admission responses was excellent across coding categories (interview mean kappa=0.89; admission mean kappa=0.93). Some participants received more than one code if their response fit more than one category. (Table 2 shows the frequencies of the codes.)

TABLE 1 ► Applicant Score Information

GPA	
First-Year	2.75/4.0
Overall	3.2/4.0
GRE	
Verbal Reasoning	55th ¹ vs. 75th ² percentile
Quantitative Reasoning	40th ¹ vs. 80th ² percentile
Analytical Writing	50th ¹ vs. 60th ² percentile

GRE Prompt:

¹ Average

² High

TABLE 2 ► Additional Information Requested by Faculty Participants

Information Category	Interview		Admission	
	n	%	n	%
Reasons for Low GPA	5	8.1	3	4.8
Reasons for GRE	6	9.7	3	4.8
Applicant’s Interest in the Program	7	11.3	11	17.7
Transcript or Specific Course Grades	10	16.1	5	8.1
Research and/or Technical Skills	10	16.1	9	14.5
Communication Skills	13	21.0	18	29.0
Personal Qualities	1	1.6	9	14.5
Letters of Recommendation	21	33.9	18	29.0
Demographic Information	2	3.2	1	1.6
Other	3	4.8	5	8.1

Next, participants were taken to a new screen (from which they were not able to change their previous responses). Participants then responded to survey items to assess demographics (*e.g.*, sex, degree year, academic discipline). To assess the first-generation college student status of faculty participants, they were also asked to indicate whether neither, one, or both of their parents had earned a bachelor’s degree. Faculty participants were coded as first-generation college students if they reported that neither of their parents had earned a bachelor’s degree.

Empathic concern and perspective taking were assessed with the Interpersonal Reactivity Index (Davis 1980), which has been used in several studies to assess

dispositional empathic tendencies (Davis 2015). Inter-item reliability for the empathic concern scale was low ($\alpha=0.49$) but was adequate for the perspective-taking scale ($\alpha=0.77$).

Belief in a meritocracy regarding success in school and academic pursuits was assessed with a psychometrically sound measure used in prior work (Wiederkehr, Bonnot, Krauth-Gruber; Darnon 2015). Inter-item reliability was adequate ($\alpha=0.74$).

Results

Participant Characteristics

The sample consisted of nearly equal numbers of female ($n=32$) and male ($n=30$) participants. Nearly all ($n=59$) held a doctorate, with the remaining three holding a master's degree or equivalent. Eleven of the participants (18 percent) were first-generation college students; 50 (81 percent) were not; one participant did not respond to the question. Half of the sample ($n=31$) were from the social and behavioral sciences, education, and business; 15 (24 percent) were from the biomedical sciences; 11 (18 percent) were from the arts and humanities; and four (6 percent) were from STEM disciplines. One participant (6 percent) did not identify with any of these groups.

TABLE 3 ► Descriptive Statistics for Non-Categorical Participant Characteristics

	Mean	SD	Min.	Max.
Age	49.2	10.1	28	77
Years of Service	13.2	9.2	0	39
Empathic Concern	22.1	3.1	14	28
Perspective Taking	22.1	4.3	10	30
Meritocratic Beliefs	25.9	6.4	14	39

Table 3 shows descriptive statistics for the non-categorical participant characteristics. All had approximately normal distributions. Table 4 shows the zero-order correlations between them. Not surprisingly, age and years of service as a faculty member at the institution were positively correlated. Perspective taking was

inversely correlated with age and positively correlated with empathic concern. In addition, the correlation between greater perspective taking and less strongly held meritocratic beliefs approached significance.

T tests were used to assess the relationships between the dichotomous participant characteristics (sex and first-generation college student) and the non-categorical ones. Participants who were themselves first-generation college students had significantly higher scores on empathic concern ($t[56]=-2.533$, $p<0.05$) and on perspective taking ($t[56]=-2.102$, $p<0.05$) (empathic concern $M=24.3$, $SD=1.25$; perspective-taking $M=24.7$, $SD=4.55$) than did participants who were not first-generation college students (empathic concern $M=21.7$, $SD=3.22$; perspective-taking $M=21.8$, $SD=3.93$). There were no significant differences on age, years of service, or meritocratic beliefs. The t tests were performed a second time with participant sex as the independent variable. Female and male participants did not differ significantly on any of the variables.

Finally, participant background characteristics were examined as potential covariates of the two main outcome variables: likelihood of interviewing the applicant presented in the vignette and likelihood of admitting that applicant. Age and years served were not significantly correlated with these outcomes. Female and male participants did not differ significantly on either likelihood of interviewing or offering admission.

Applicant and Faculty Characteristics as Correlates of Admission Decisions

Zero-order correlations were computed between the key participant characteristics (empathic concern, perspective taking, and meritocratic beliefs) and the two main outcome variables: likelihood of interviewing the applicant whose vignette they read and likelihood of admitting that applicant. Just one of these six correlations was significant: Participants with higher empathic concern scores were more likely to interview the applicant ($r[56]=0.320$, $p<0.05$).

T tests were performed using first-generation status of the participant as the independent variable and likelihood of interviewing or offering admission as the depen-

dent variable. First-generation participants gave significantly higher likelihoods of admittance than participants who were not first-generation students ($t[56] = -2.108$, $p < 0.05$). There was no difference in terms of interview likelihoods.

Table 5 shows the mean percent likelihood ratings for both interviewing and admitting the applicant in each vignette. Several regression models were fitted to the data to address the primary research questions. The starting point was a simple model containing the applicant's GRE scores (high vs. average) and whether the applicant was noted as being a first-generation college student. No faculty participant characteristics were included in this first model. There was a significant main effect of applicant GRE score ($t[57] = 3.233$, $p < 0.01$). Applicants with high GRE scores were 19 percent more likely to be granted an interview than were those with average GRE scores. Mention of the applicant's status as a first-generation college student did not have an effect, and there was no statistical interaction between GRE scores and the applicant's first-generation status.

The same pattern held with admission likelihood as with the dependent variable. Applicants with high GRE scores were 17 percent more likely to be admitted than were those with average GRE scores ($t[56] = 2.696$, $p < 0.01$). Mention of the applicant's status as a first-generation college student did not have an effect, and there was no interaction.

Interactions Between Applicant and Faculty Characteristics

It was expected that individual differences among faculty may interact with information about the applicant in predicting admission decisions. Thus, a separate

TABLE 4 ► Zero-Order Correlations for Non-Categorical Participant Characteristics

	Years of Service	Empathic Concern	Perspective Taking	Meritocratic Beliefs
Age	0.695 ^c	-0.071	-0.315 ^b	0.049
Years of Service		0.011	-0.155	0.020
Empathic Concern			0.510 ^c	-0.111
Perspective Taking				-0.247 ^a

^a $p < 0.06$; ^b $p < 0.05$; ^c $p < 0.001$

TABLE 5 ► Mean Likelihood Ratings for Interviewing and Admitting Applicants

		Average GRE		High GRE	
		Mean	SD	Mean	SD
First-Generation Status Mentioned	Interview	64.9	38.6	89.4	13.2
	Admit	52.9	35.9	78.3	18.1
First-Generation Status Not Mentioned	Interview	73.6	24.9	87.8	13.5
	Admit	63.2	17.2	72.9	24.8

model was fitted for each of the participant characteristics in which that characteristic was allowed to interact with the two variables experimentally manipulated (*i.e.*, high vs. average GRE and mention vs. no mention of the applicant's first-generation status).

Two of the participant characteristics interacted with applicants' GRE scores in predicting the likelihood that an applicant would be interviewed: one was the participant's empathic concern ($t[51] = -2.231$, $p < 0.05$); the other was the participant's perspective taking ($t[51] = -2.335$, $p < 0.05$).

Figure 1 shows the conditional effects of empathic concern (left panel) or perspective taking (right panel) for the two levels of GRE scores. In both cases, the slopes for applicants with average GRE scores are significantly different from zero while the slopes for applicants with high GRE scores are not.

Turning next to the likelihood of admitting an applicant as the dependent variable, there was a main effect of empathic concern ($t[53] = 2.175$, $p < 0.05$). Consistent with the zero-order correlation discussed previously, higher scores on empathic concern were associated with greater likelihoods of offering admission.

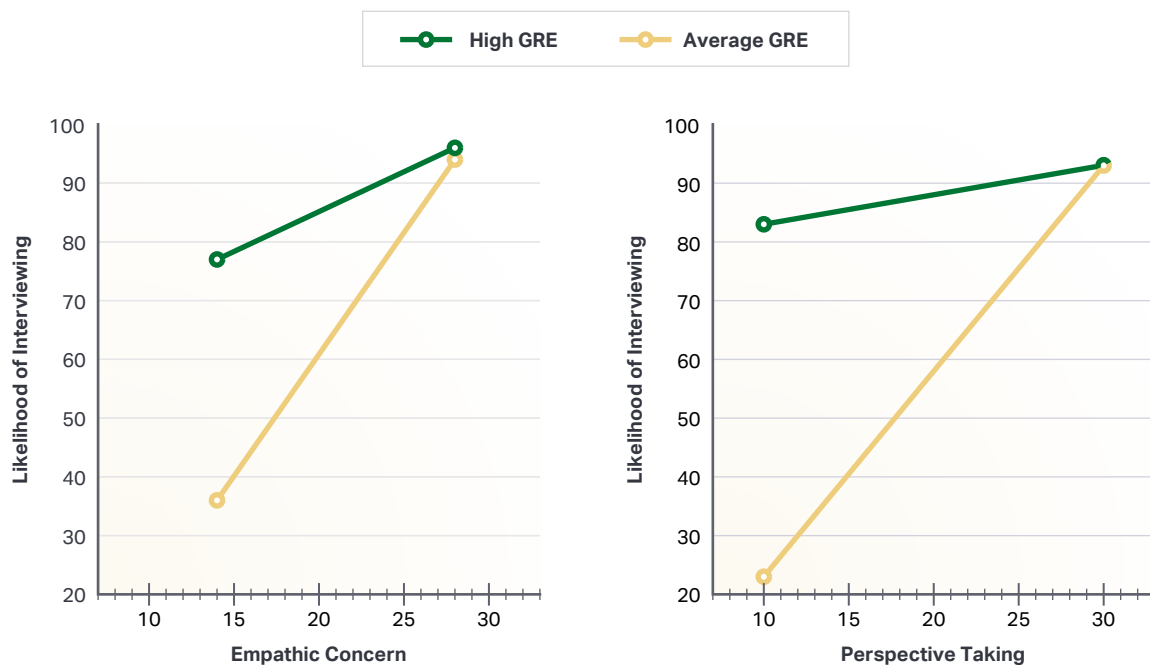


FIGURE 1 ➤ Likelihood of Interviewing an Applicant as a Function of Applicant GRE Score and Participant Empathic Concern or Perspective Taking

More interesting was a significant three-way interaction between the experimentally manipulated variables and the participant's status as a first-generation college student ($t[50] = -2.151, p < 0.05$). An inspection of Figure 2 shows that faculty participants who were not first-generation college students provided lower likelihoods of admitting the applicant with the average GRE score if the vignette made mention of the applicant's first-generation college student status than if the vignette did not mention this status. When the GRE scores were higher in these vignettes, there was a slightly higher likelihood of admitting the applicant whose first-generation status was mentioned than of admitting the applicant whose first-generation status was not mentioned.

In contrast, faculty participants who were first-generation college students were more likely to admit the applicant with an average GRE score if the vignette mentioned the applicant's first-generation status. These faculty were also slightly less likely to admit the applicant with the high GRE score if the applicant also was a first-generation college student.

Additional Information Requested by Faculty Participants

Recall that participants could indicate whether they would like to have had additional information about the applicant. Approximately two-thirds ($n = 42$) and three-quarters ($n = 46$) requested additional information for their interview and admit decisions, respectively. Participants who asked for any information reported a lower likelihood of admittance ($M = 62.97$ percent, $SD = 25.48$) than did participants who did not request additional information ($M = 79.80$ percent, $SD = 21.15$), $t(57) = 2.54, p = 0.014$. No such difference was found for interview likelihood. There were also no main or interactive effects of vignette on the likelihood of requesting additional information about the applicant, nor were first-generation participants more or less likely to request additional information.

However, the types of information requested by the participant were related to interview likelihood. Specifically, participants who requested information about the applicant's GRE score were less likely to interview the

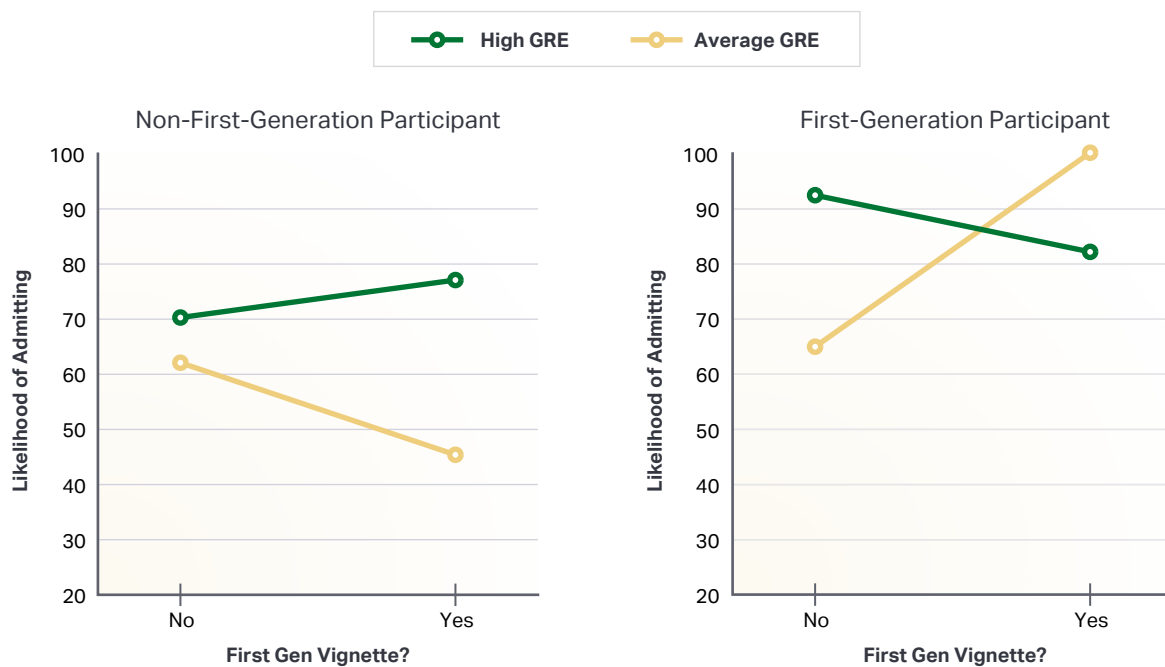


FIGURE 2 ➤ Likelihood of Admitting an Applicant as a Function of Applicant GRE Score, Mention That Applicant is a First-Generation College Student, and Participant Status as First-Generation College Student

applicant ($M=53.67$, $SD=27.54$) than were those who did not ask about the GRE score ($M=84.07$, $SD=21.84$), $t(58)=3.16$, $p=0.003$. Participants who asked to see the applicant's transcripts or particular course grades were also less likely to interview the applicant ($M=63.63$; $SD=33.84$) than were participants who did not request this information ($M=83.71$, $SD=21.36$), $t(58)=2.28$, $p=0.026$. Finally, similar differences were observed with respect to requesting information about the applicant's research skills (requested $M=66.20$, $SD=35.48$; not requested $M=84.00$, $SD=20.26$), $t(58)=2.21$, $p=0.031$. None of the information requested after making admission ratings was associated with admittance likelihood.

Discussion

Research has demonstrated that a key phase of effective graduate enrollment management is the graduate admission process. This critical juncture is susceptible to choices that interfere with efforts to enhance diversity (Posselt 2014). Students whose parents have not earned a bachelor's degree are underrepresented in doctoral

programs; however, these students have received little attention with respect to diversity efforts in graduate education. Therefore, one purpose of this study was to test the extent to which faculty reviewers would account for this status during their doctoral program admission decisions. The current study also investigated the role of standardized test scores and faculty reviewers' own personal characteristics in the admission decision-making process.

With respect to applicant characteristics, faculty participants were more likely to interview and admit applicants with higher standardized test scores. This should be no surprise as research has demonstrated the predictive validity of the GRE (Kuncel *et al.* 2001) and illuminated graduate admission processes at elite institutions (Posselt 2014). It was expected that the vignettes mentioning first-generation college student status would receive less favorable decisions. Generally, this proved not to be the case, although the effects of student status depended on GRE scores and faculty characteristics (as described below).

With respect to faculty characteristics, participants with a greater tendency to “feel for” others (*i.e.*, empathic concern: Davis 2015) were more likely to interview applicants, and first-generation faculty participants were more likely to admit them. These findings support the hypothesis that an empathic orientation may lead to reframing of applications in a more positive light. In addition, empathic concern scores were greater among faculty who were first-generation college students than among those whose parents had earned at least a bachelor’s degree. It is possible that given their personal experience, faculty who had been first-generation college students were more likely to take an empathic orientation, but this collection of results suggests that an empathic orientation is not limited to faculty who had this experience themselves.

The impact of personal experiences and an empathic orientation also depended on applicant characteristics, as evidenced by several statistically significant interactions predicting the likelihood of interview and admission. Greater empathic concern and perspective taking were associated with a higher likelihood of interviewing the applicant when faculty reviewed the applicant with the average GRE score. When faculty received the high-GRE vignette, empathic concern and perspective taking were not associated with likelihood of interview. There may be two reasons for these findings: First, an empathic orientation, regardless of the faculty member’s status as a first-generation college student, may lead him to consider situational factors that may have affected the applicant’s academic trajectory as an undergraduate. For instance, each vignette noted that the applicant had a low first-year GPA and that he also worked part time and volunteered. Second, the fact that empathic orientation did not affect admission likelihood when GRE scores were higher demonstrates that standardized test scores matter greatly. As noted by a growing number of researchers, many faculty members implicitly believe that as gatekeepers of the profession, they must judge merit or “deservingness” to pursue doctoral education on the basis of evidence (Jury, Smeding, and Darnon 2015; Smith and Garrison 2005). Standardized test scores have become the gold standard of evidence, but merit

can be construed in other ways, such as how well a particular student can fulfill valued goals set forth by the university or program (*e.g.*, research productivity: Hall, O’Connell, and Cook 2017; civic-mindedness: Hurtado and DeAngelo 2012; inclusive excellence: Posselt 2014).

Applicant characteristics (first-generation college student status and GRE score) interacted with first-generation status of the faculty participant to predict the likelihood of admittance. Of particular interest are the admission likelihoods for the applicants with average GRE scores. First-generation faculty participants appeared more likely to admit first-generation applicants than applicants with no mention of this status. In contrast, faculty who were not first-generation college students appeared to favor the applicant whose vignette did not mention first-generation status. One possible interpretation of this finding supports theories of in-group bias (Hewstone *et al.* 2002). Although faculty GRE scores were not collected, it can be hypothesized on the basis of ETS data (Educational Testing Service 2016b) that faculty who were first-generation college students had earned lower GRE scores than had faculty who were not first-generation college students. If this is the case, then perhaps first-generation faculty are expressing a bias toward applicants like themselves because the applicants are appraised as in-group members. It is also possible that first-generation faculty can empathize with the situational constraints that the first-generation, average-scoring GRE applicant may have faced, supporting an empathy effect. Consistent with the empathic concern and perspective-taking findings in which it was found that empathic orientation interacted with GRE scores, personal experience as a first-generation college student may elicit empathy for the applicant. This explanation also may explain why first-generation college student faculty reported a slightly lower likelihood of admitting the applicant with the high GRE scores if the vignette included mention of first-generation status than if the vignette omitted this information. Perhaps the high-scoring first-generation applicant is viewed as part of the “out group,” or the faculty participant did not perceive any compelling mitigating circumstances in the vignette.

In contrast, faculty who were not first-generation college students may be aware of the research on the challenges confronted by first-generation college students. Faced with the prospect of mentoring students who may need to accommodate to different cultural demands (Martinez *et al.* 2009; Steele 1997; Stephens, Fryburg *et al.* 2012; Valentine *et al.* 2016), these faculty may be more hesitant to admit these students unless they have mitigating information (*e.g.*, high GRE scores). These interpretations are speculative given the small sample size, and the results should be replicated before drawing conclusions. Additional work to test the role of the characteristics that faculty members bring to the evaluation of applicants from different backgrounds is recommended.

As part of the current study, faculty participants were permitted to request additional information about the applicants to provide clues as to the manner in which they interpreted the vignettes. The most requested information included letters of recommendation and communication skills, followed closely by research and technical skills, interest in the program of study, the transcript, and, at the admitting stage, personal qualities (*e.g.*, personality characteristics, persistence, enthusiasm, maturity). Faculty members who asked for transcripts and for information about the applicant's research skills were less likely to interview the applicant; these differences did not depend on applicant and faculty characteristics. It is unclear how additional information about the applicant's file would have been used had it been available. Additional evidence can be used to give a student the "benefit of the doubt," but it can also be used to justify ruling out a candidate. For example, higher education selection studies have found that search committees often disqualify candidates based on their appraisals of their personalities and the extent to which they anticipate the candidates will fit in socially and culturally (Danowitz-Sagaria 2002; Posselt 2014). Certain students may be at a disadvantage with regard to meeting the poorly defined standard of "good fit." For example, first-generation college students, whose values and experiences may differ from those of students whose parents attended college (*e.g.*,

Martinez *et al.* 2009; Stephens, Townsend *et al.* 2012) may be evaluated less positively because they seem not to fit the norm, perhaps in that they do not use the same expressions or formal academic language as peers who were raised by college-educated parents. The findings that interview and admission decisions are based on a combination of factors suggest that additional research is needed to better understand how multiple pieces of admission information are evaluated differently depending on both applicant and faculty characteristics.

The results of this study should be interpreted in light of several limitations. First, there are several limitations concerning the sample. Additional research is needed to determine if the findings are generalizable to other universities and specific disciplines. In addition, the proportion of faculty members who themselves had been first-generation college students was low. No publications or reports seem to document the numbers of such faculty members; however, the low numbers of first-generation college students who pursue and earn doctoral degrees (Choy 2001; Hoffer *et al.* 2003; National Science Foundation 2017) suggests that the sample is representative of faculty at other college campuses. Race and ethnicity data were not collected because of the concern that faculty who were members of minority groups underrepresented in higher education would be easily identified. Additional research on first-generation and other identities such as race, ethnicity, disability, sex, gender, and sexual orientation is needed. A second limitation concerns the ecological validity of the study as an experimental design with a brief vignette. Additional research could use expanded admission portfolios that include curriculum vitae, personal statements, and letters of recommendation. On average, first-generation students have lower GRE scores than do students whose parents enrolled in college (Educational Testing Service 2016b); other differences in cultural capital and socioeconomic background also exist (Carlton 2015; Martinez *et al.* 2009). Thus, it may be difficult to construct equivalent portfolios that are also representative of the student applicant population. Focus groups and interviews (see Posselt 2014) may also be utilized to delve into the thought processes of how different

groups of people use experimental and actual materials for admission decision making. Last, while meritocratic beliefs (that is, that hard work always results in positive outcomes) were hypothesized to reduce empathic capacity, this variable did not contribute much beyond a marginal and negative correlation with perspective taking. It is possible either that other measures tailored to the graduate education context could be developed and tested or that these beliefs are not as important as other faculty characteristics.

Despite these limitations, the current findings have implications for research and practice concerning diversity in graduate education. An empathic orientation and experience as a first-generation college student increase the likelihood that faculty will make favorable graduate admission decisions, especially when the applicant has not earned a high GRE score. The effect of faculty's first-generation status is even more pronounced when the applicant is also a first-generation college student. One could argue that giving more graduate school applicants the benefit of the doubt would make a difficult selection task even more difficult, but the current study suggests that some faculty may be more amenable to holistic review. Such review typically includes clear definitions and rationales of ideal applicant characteristics relative to a program's mission and evaluations of the applicant's entire package rather than making initial determinations on the basis of standardized test scores (American Association of Medical Colleges 2010; Educational Testing Service 2016a; Kent and McCarthy 2016). Increasingly, researchers, funding agencies, universities, and employers are interested in developing admission processes that can enhance the educational and creative missions of their organizations (Hurtado 2001; Valentine and Collins 2015). Calls for the creation of a "culture of performance" in graduate education may also provide GEM professionals with the tools to document how holistic review meets SEM standards and produces desired student and institutional outcomes (Bolyard 2013). Continued research of graduate admission using experimental and in-vivo designs may provide clarity as to the best ways to enact holistic review with the full cooperation of faculty members.

The current findings regarding the type of information that is often requested to further evaluate applicants imply that more guidance should be given to undergraduates about graduate careers, including the successful preparation of graduate applications (tasks in which SEM and GEM professionals are already engaged). First-generation college students across racial and socioeconomic categories often lack cultural capital or "insider knowledge" regarding how to succeed in higher education (Soria and Stebleton 2012) and consequently may be unaware of the job prospects available to people with advanced degrees. They and other students may not learn about these careers until their final years as undergraduates, by which time they may choose other careers. Those students who lack cultural capital and who do pursue graduate education may be less knowledgeable about the graduate application process. For example, students may be unaware of the importance of research experience outside the classroom and may lack the research skills and strong letters of recommendation that faculty emphasized in the current study. In addition to addressing these pipeline issues, faculty may benefit from training specific to equity and inclusion; Milkman *et al.* (2015) found that gender and racial bias occur even before the graduate admission stage. Programs like the McNair Scholars Program,² the National Research Mentoring Network,³ and NIH Building Infrastructure Leading to Diversity (BUILD) Initiative⁴ can counter these trends by offering faculty mentors and students knowledge about mentoring and career paths as well as training in essential research skills so they can succeed in graduate education and the workforce.

² See <mcnairscholars.com>.

³ See <nrmnet.net>.

⁴ See <nigms.nih.gov/training/dpc/Pages/build.aspx>.

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