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RESEARCH REPORT

Graduate Admissions Practices: A Targeted Review of the Literature

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This review of the literature covers 5 major areas within the graduate admissions process: (a) the decentralized nature of graduate admissions; (b) the types of materials that are collected as part of the application process, including standardized test scores; (c) the variety of admissions models that are used to make admissions decisions; (d) training and tools used by graduate admissions committees to support the graduate admissions process; and (e) admitting diverse applicants. The literature review concludes with a discussion of the findings and the areas for future research.

Keywords Graduate admissions; admissions practices; diversity; holistic review; whole file review; full file review

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Graduate education in the United States is relatively new; the first doctoral degree was not awarded by an American university until 1861 (Hollis, 1945). Fifty years later, William James (1903) remarked, “Graduate schools still are something of a novelty, and higher diplomas something of a rarity” (p. 332). Even by 1930, A. Lawrence Lowell, then president of Harvard University, could state that relatively little thought was being given to standards for selecting graduate students (Lowell, 1932). Hollis (1945) noted that, although graduate school attendance experienced significant growth after World War 1, it was not until the 1950s and 1960s—with the institution of the GI Bill of Rights, expansion of the middle class, and influx of federal funds for research—that graduate admissions became a topic of widespread interest and study (Gumport, Iannozzi, Shaman, & Zemsky, 1997; Weislogel, 1950; Willingham, 1974). With the rise of graduate school attendance, general reviews of graduate education and admissions practices expanded apace, appearing with increasing regularity since the mid-20th century (e.g., Brink, 1939; Burnett, 1954; Burns, 1970; Carmichael, 1961; Magoun, 1969). More recently, discipline-specific reviews have become widespread in fields as various as anthropology (Marks, 2011), construction management (Wao, Ries, Flood, Lavy, & Ozbek, 2016), criminal justice (Reisig & DeJong, 2005), health professions (Hall, O’Connell, & Cook, 2017; Mamary & Roe, 2004; Moneta-Koehler, Brown, Petrie, Evans, & Chalkley, 2017; Urban Universities for Health, 2014), political science (King, Bruce, & Gilligan, 1993), social work (Miller & Koerin, 1998), and speech-language pathology (Baggs, Barnett, & McCullough, 2015; Halberstam & Redstone, 2005).

Regardless of discipline, the mainstays of graduate admissions materials have been the undergraduate transcript and standardized test scores (Hackman, Wiggins, & Bass, 1970; Merenda & Reilly, 1971; Savage, 1953; Weber, Brink, & Gilliland, 1942). Recently, however, calls for more *holistic file review* (also known as *whole file review* and *full file review*) within the context of graduate admissions have been drawing the attention of graduate programs across the United States. Holistic file review is a process by which programs consider a broad range of characteristics, including both cognitive and noncognitive qualities, when reviewing applicants’ files. Many institutions see holistic file review as a process that can be used to address current issues related to admitting a more diverse group of applicants to graduate school programs because using broader admissions criteria may allow entry for a variety of students with different strengths and aptitudes. Two publications in particular, Julie Posselt’s (2016) *Inside Graduate Admissions: Merit, Diversity, and Faculty Gatekeeping* and a recent report from the Council of Graduate Schools (Kent & McCarthy, 2016), *Holistic Review in Graduate Admissions*, have focused attention on holistic review.

The current report differs from previous efforts in that it is neither highly general nor highly specific; it does not focus on graduate admissions overall, graduate admissions in a single discipline, or a single graduate admissions strategy.

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This review is unique in that it was developed in response to the results of interviews conducted by Educational Testing Service (ETS) staff with directors of graduate studies, graduate school admissions directors, and graduate deans, faculty, and admissions staff (Payne, 2017). These interviews identified five themes and pressing needs for investigation: (a) the decentralized nature of graduate admissions, (b) the types of materials that are collected as part of the application process, including standardized test scores, (c) the variety of admissions models that are used to make admissions decisions, (d) training and tools used by graduate admissions committees to support the graduate admissions process, and (e) admitting diverse applicants. This report consists of five sections examining these topics and concludes with a discussion of these findings and areas for future research.

Decentralized Admissions Process

Researchers (e.g., Kent & McCarthy, 2016; Orfield, 2014) have noted the decentralized nature of graduate admissions in comparison to undergraduate admissions. Consequently, graduate admissions decisions are often made by small department- or program-level committees, whereas the campus-wide graduate school serves mainly as a check to make sure that applications are complete and meet all graduate school requirements. More than 70% of respondents to Kent and McCarthy's survey of graduate staff and faculty involved in the graduate admissions process indicated the process was decentralized on their campus. Respondents indicated academic departments as the entities most directly responsible for making both master's and doctoral level admissions decisions. Graduate school staff, or the dean her or himself, are sometimes responsible for making the final, "official" admissions decisions, often an endorsement of the judgment that has already been made at the department level. Generally, the graduate school will have various goals related to admissions (e.g., increasing diversity), which may or may not align with the goals of the program. Orfield (2014) noted that one implication of this process is that when the goals of the graduate school and the goals of specific graduate programs—or faculty members within them—are not in full agreement, it can create implementation challenges, specifically in terms of supporting the graduate school's mission or diversity objectives, along with the goals of programs and their faculty members.

Admissions Materials

Although graduate admissions is usually a decentralized process, admissions materials are generally required to be submitted directly and electronically to the graduate school. Once submitted, the graduate school admissions staff may also be responsible for ensuring the submitted applications are complete and may communicate with applicants about the completeness of their applications. Once completeness has been determined, graduate school staff distribute the relevant materials to the appropriate academic programs. Aasheim, Williams, Kemp, Williams, and Spence (2009) provided insight into the process for implementing an electronic application system.

Graduate programs require applicants to submit a variety of information to provide insight into their academic preparedness for graduate study, interest in the program to which they are applying, social and emotional skills (e.g., grit, perseverance, ability to overcome challenges, motivation), and depending upon the program, research experience or potential to conduct research and potential for success in the program and eventual contribution to the field. The most commonly requested materials include transcripts (including undergraduate grade point average [GPA]), letters of recommendation, personal statement(s), and standardized test scores. Other materials may include a CV or resume, writing samples, interviews (usually for a select group of applicants who are of particular interest to the program), and/or a diversity essay (i.e., an essay about the applicant's background and identity within a category such as ethnicity or race, gender or sex, socioeconomic status, disability, sexual orientation; the essay is generally optional). The weight that programs place on the various components can vary from program to program and often is not made explicit even to the admissions committee members who are making the admissions decisions (Orfield, 2014; Posselt, 2016). Consequently, the research is not clear on how these components are considered or what combination of these components are most valuable in informing admissions decisions.

The University of Michigan Rackham Graduate School (The Regents of the University of Michigan, 2019) provided an exception to this typically opaque process. Published on its website are descriptions of three components that are important in the evaluation of candidates for its graduate programs: academic performance, research potential, and persistence and commitment. Specific guidance is provided to graduate programs about where within the graduate application the

reviewer should look for information pertaining to these three components. Although this information is still at a high level, it is much more descriptive than what is communicated by most graduate programs. However, one pitfall is that the criteria used to evaluate applicants are not plainly stated on the applicant web page itself, and thus applicants may not be able to take advantage of such important information when preparing their applications materials—or preparing for graduate school in general.

Of the aforementioned commonly requested materials, GPA and standardized test scores such as *GRE*[®] scores are the most frequently researched admissions criteria in published studies. This is largely due to the fact that these criteria are the most easily quantifiable and can be included in statistical models that predict outcomes such as first-year graduate GPA (e.g., Kuncel, Wee, Serafin, & Hezlett, 2010), faculty ratings of performance, coursework examination results, number of publications and publication citations, master's or doctoral degree completion, and time to degree. Other criteria, such as noncognitive factors, have been less frequently researched; however, we discuss them as well as GRE scores in the two subsections that follow.

Measures of Cognitive Skills

Although GRE scores are only one part of the application materials that may be submitted by applicants, they are the most widely studied component of the application, likely due to the quantitative nature of the scores and the “relative ease” of examining relationships between GRE scores and other quantitative success outcomes such as first-year graduate GPA. Their research appeal may also be due to the fact that the use of GRE scores in graduate school admissions is extensive and widespread (e.g., Kuncel, Hezlett, & Ones, 2001). In the most recent data reported by the GRE Program (ETS, 2017a), over 580,000 individuals took the GRE General Test between July 2015 and June 2016.

Despite criticisms of the predictive utility and limitations of the use of GRE scores (e.g., Hall *et al.*, 2017; Miller, Zwickl, Posselt, Silvestrini, & Hodapp, 2019; Moneta-Koehler *et al.*, 2017; Petersen, Erenrich, Levine, Vigoreaux, & Gile, 2018), an extensive body of literature has documented validity evidence for the GRE General Test¹ for both domestic (e.g., Burton & Wang, 2005; Kuncel *et al.*, 2001; Powers, 2004; Reisig & DeJong, 2005) and international populations (e.g., Liu, Klieger, Bochenek, Holtzman, & Xu, 2016; Schwager, Hülshager, Bridgeman, & Lang, 2015; Zimmermann, von Davier, Buhmann, & Heinemann, 2018). GRE General Test scores have been found to predict graduate GPA (Klieger, Cline, Holtzman, Minsky, & Lorenz, 2014; Liu *et al.*, 2016; Schwager *et al.*, 2015) and program standing and to add incremental value to the prediction of graduate GPA versus using undergraduate GPA alone as a predictor (Liu *et al.*, 2016). GRE Quantitative Reasoning and GRE Verbal Reasoning have been found to predict both first-semester MBA GPA and cumulative MBA GPA, above and beyond undergraduate GPA (Klieger, Bridgeman, Tannenbaum, Cline, & Olivera-Aguilar, 2018; Young, Klieger, Bochenek, Li, & Cline, 2014). GRE Analytical Writing scores also added incremental value to a prediction of graduate GPA above and beyond undergraduate GPA as a sole predictor of graduate GPA (Schwager *et al.*, 2015).

Nevertheless, there is also the sentiment that GRE scores, and standardized test scores in general, are not appropriate or informative predictors of success in graduate school, particularly for certain populations (e.g., Hagedorn & Nora, 1996; Pacheco, Noel, Porter, & Appleyard, 2015). ETS has consistently advised against the use of cut scores for any students (ETS, 2017b), but cutoffs may be particularly problematic for populations such as those who have been out of school or working for many years, those applying to non-science or non-math-related programs, and underrepresented minority students, all of which have been highlighted as inappropriate groups for the application of GRE score cutoffs or benchmarks during the admissions process (Katz, Chow, Motzer, & Woods, 2009; Miller & Stassun, 2014; Sacks, 2001). Use of cut scores is particularly damaging when admissions faculty seek to increase the ethnic diversity of their graduate programs, as lower mean scores among members of some ethnic groups (e.g., African American, Latinx) increase the likelihood that constituents of those groups will be screened out disproportionately early in the selection process. Critical educators and researchers argue that because of findings that GRE scores vary by ethnicity or gender (specifically, in many STEM fields), along with the financial burdens associated with test preparation and test taking across applicants of varying socioeconomic status, the GRE should be either deemphasized or eliminated from the graduate admissions process.

Undergraduate GPA is traditionally the second major measure of cognitive skills commonly included in graduate applicant materials. Ironically, part of the predictive power of GPA lies in the fact that it can be interpreted as being partially influenced by noncognitive skills as well as cognitive skills (Kautz, Heckman, Diris, ter Weel, & Borghans, 2014). This is because undergraduate GPA constitutes a cumulative record of success (or failure) that stretches over an extended period

of time and many diverse courses. Success over such a period demands not only reasoning and knowledge (i.e., cognitive skills) but also noncognitive attributes such as persistence, planning, and time management. Despite its appeal and ready availability, however, the interpretation of undergraduate GPA can be complicated by grade inflation, including potentially differential inflation across public, private, and community colleges (Jaschik, 2016; Kostal, Kuncel, & Sackett, 2016), students retaking courses in which they did poorly (Selingo, 2018), differences in course-taking patterns among applicants (Berry & Sackett, 2009; Keiser, Sackett, Kuncel, & Brothen, 2016), reliabilities of grades across disciplines and institutions (Beatty, Walmsley, Sackett, Kuncel, & Koch, 2015), and the quality of the learning environments fostered by professors within and across institutions (e.g., Goodboy & Myers, 2008; Rosenfeld & Jarrard, 1985; Trolian, Jach, Hanson, & Pascarella, 2016). Despite these challenges to interpreting undergraduate GPAs, however, they are usually comparable to GRE scores in their ability to forecast success in graduate school, and sometimes exceed the predictive value of GRE scores (e.g., Schwager *et al.*, 2015). Moreover, although mean ethnic differences in undergraduate GPAs are observed (e.g., Davis *et al.*, 2013; Fletcher & Tienda, 2010; Roth & Bobko, 2000), the magnitude of these differences is often less than that on standardized tests, including the GRE.

Measures of Social and Emotional Skills

Social and emotional skills, in the context of education and graduate school admissions, are broadly defined as individual differences that reflect personality, motivation, attitudes, or other relatively stable personal characteristics that fall outside traditional measures of cognitive ability. There is a body of literature demonstrating the importance of social and emotional skills in predicting general education, work, and life outcomes (see Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). In terms of graduate admissions, social and emotional skills are perceived as an important contributor to graduate school success by both educators and educational researchers (Kent & McCarthy, 2016; Pacheco *et al.*, 2015; Sowbel & Miller, 2015; Ward, 2007). Powell (2013) described graduate programs that screen for *grit*, a trait defined as perseverance in pursuing long-term goals, and McGee and Keller (2007) identified key social and emotional skills for success such as curiosity, flexibility, independence, and problem-solving. These perceptions of the importance of social and emotional skills in predicting graduate student success are reinforced by both empirical evidence and psychological theory.

In an influential meta-analysis of personality correlates of academic performance at primary, secondary, and tertiary educational levels, Poropat (2009) found that personality, specifically conscientiousness, predicts academic performance across ages and school groups. Poropat summarized some theoretical arguments for the reasoning behind this relationship as based on “personal willingness to perform,” which reflects motivation, initiative, attitudes, and other associated social and emotional skills and variables that should theoretically lead to high academic performance. Other researchers have found conscientiousness to be a significant predictor of graduate/professional school performance—specifically, academic performance in medical school (Doherty & Nugent, 2011), field performance in a social work master’s program (Sowbel & Miller, 2015), and graduate psychology internship ratings (Grehan, Flanagan, & Malgady, 2011).

Besides conscientiousness, other personality factors have been found to predict academic performance, as indexed by graduate GPA. Sowbel and Miller (2015) found that openness to experience, agreeableness, and extraversion predicted graduate GPA in a master’s level social work program, and Grehan *et al.* (2011) found that emotional intelligence predicted graduate GPA of school psychologists-in-training. In terms of non-GPA outcomes of graduate success, Martinsuo and Turkulainen (2011) found that plan commitment and goal commitment related to study progress during doctoral studies among engineering and management doctoral students in Finland. Finally, Green (1997) found that subscale scores on a measure of procrastination were, as expected, significantly higher for “dissertation-delayers,” also known as “ABD” (all but dissertation), than for psychology graduate students who had completed their dissertations.

Given the evidence linking certain social and emotional skills and graduate school success, as well as the perception among admissions committees that social and emotional skills are important indicators of success, it is important to understand how these skills are examined or addressed during the admissions process. Much of the time, the personal statement is used by admissions committees as a window into participants’ social and emotional skills. Diminnie’s (2012) *An Essential Guide to Graduate Admissions*, published by the Council of Graduate Schools (2009), specifically cited personal statements as a key source of information on applicant social and emotional skills:

The open-ended response gives the applicant an opportunity to provide further evidence of potential success as a graduate student that may not be reflected in the standard application materials, such as test scores or grade point

average. Attitudes, values, motivation, determination, and creativity may play an important role in assessing an applicant's potential for success. The department should have a systematic way of evaluating whatever statement it requires. (p. 30)

Other sources of information about social and emotional skills during the admissions process include letters of recommendation, which can convey advisor ratings of key personal characteristics, and interviews, which, whether in structured or unstructured format, frequently attempt to capture or otherwise assess social and emotional skills, attitudes, and values. Consistent with the assertion that personal statements and letters of recommendation can serve as windows into applicants' noncognitive skills, among standard packages of application materials, scores on personal statements have been found to be most highly correlated with those on letters of recommendation and vice versa (Kuncel, Kochevar, & Ones, 2014; Murphy, Klieger, Borneman, & Kuncel, 2009); scores on both were shown to be positively related to graduate school success, although not to the same degree often observed for scores on cognitive measures (e.g., Kuncel *et al.*, 2001; Kuncel *et al.*, 2010).

Despite a shared understanding of the importance of social and emotional skills among stakeholders (e.g., admissions committee members, educators, and researchers), current methods (e.g., personal statements, interviews, letters of recommendation) typically used to capture such skills are rarely standardized. Researchers have attempted to systematically assess or derive reliable scores of social and emotional skills from these methods, to little avail. For example, GlenMaye and Oakes (2002) sought to objectively score personal statements of social work master's applicants but found inter-rater reliability to be below the recommended .70 threshold. As such, there appears to be a clear opportunity to develop and encourage the use of reliable and valid measures of social and emotional skills during the admissions process to help identify students who will achieve academic and career success. ETS, for instance, developed the Personal Potential Index (PPI),² which asked recommenders to rate characteristics such as teamwork, communication skills, resilience, and planning and organization as valid and reliable alternatives to letters of recommendation (Megginson, 2009).

Other Admissions Materials

Although GRE scores and undergraduate GPA are sometimes evaluated in the context of the applicant's entire file (i.e., when holistic review is performed), there is relatively little research examining how the information provided in other application materials (e.g., letters of recommendation, transcripts) is evaluated in graduate admissions. Landrum (2003) examined the impact of transcripts, and specifically withdrawals from undergraduate courses, in the graduate admissions process and found that a few withdrawals may not impact an applicant's chances of admission, but multiple withdrawals and the types of courses from which the applicant withdrew (e.g., a major course, a required course, advanced courses taken in the last 2 years of the undergraduate program) may be detrimental and result in a denial of admissions to the program. Kuncel *et al.* (2014) conducted a meta-analysis of the predictive validity of letters of recommendation and found modest correlations between letters of recommendation and outcomes such as GPA in graduate school, faculty performance ratings, and PhD attainment. The authors identified issues that may lower the predictive validity of letters of recommendations, such as the difficulty admissions committee members face in evaluating letters when they are almost always all positive, due to recommendation writers having been strategically chosen by the applicants. Kuncel and colleagues suggested that if letters are structured to collect information about specific indicators of applicants' potential for success in graduate school (e.g., drive, motivation, persistence), it might improve their predictive validity.

Norcross, Kohout, and Wicherski (2005) noted that in psychology graduate programs, according to departmental representatives, letters of recommendation receive the highest overall ratings of importance for making admissions decisions, followed by the personal statement, GPA, interview, research experience, and GRE scores. Similarly, Klieger, Belur, and Kotloff (2017) found that recommendation letters from known faculty were ranked as the most important credential during the admissions decision-making process, followed by the personal statement, *TOEFL*[®] scores, and GPA.

Varieties of Graduate Admissions Models

Holistic file review (whole file review, full file review) is a process by which programs consider a broad range of characteristics, including both cognitive and noncognitive qualities, when reviewing applicants' files. Although considering multiple qualities of applicants has been the practice of many graduate programs for some time, the term *holistic review*

has taken on new meaning to indicate slightly more than this. Indeed, many institutions see holistic file review as a process that can be used to address current issues related to admitting a more diverse group of applicants to graduate school programs because using broader admissions criteria may allow entry for a variety of students with different strengths and aptitudes. Two publications in particular, Julie Posselt's (2016) *Inside Graduate Admissions: Merit, Diversity, and Faculty Gatekeeping* and a recent report from the Council of Graduate Schools (Kent & McCarthy, 2016), *Holistic Review in Graduate Admissions*, have collected information about the holistic file review process through direct observations of faculty engaged in the graduate admissions process and the admissions decision-making process, and by using focus groups and surveys of faculty and staff involved in the graduate admissions process.

One of the greatest challenges in implementing a holistic review model is how to practice such review for a large number of applications. In such cases, programs often use the quantitative components of the application (i.e., GPA and GRE scores) to decrease the size of the initial application pool so that the process is more manageable and so the admissions committee can conduct a full review of all of the remaining applications. However, various researchers have noted this practice is not aligned with holistic file review and may work against any diversity-related goals that may be important to the graduate program or school (e.g., Posselt, 2016). In its purest form, holistic review entails faculty members evaluating all the components of every application. As this process is very time-consuming when a program receives a large number of applications, some faculty evaluators use quantitative metrics (e.g., GPA and/or GRE scores) to “triage” the applications they will review first, ordering candidates according to scores on those metrics. In these cases, the GPA/GRE metric does not serve as a cut score but merely signals to faculty members where to devote their attention first, and they are free to examine the full applications of those who fall lower in the ordering. A different admissions model—which may or may not utilize holistic review procedures—entails the acceptance of cohorts of students rather than individual faculty members accepting specific students (e.g., Columbia College, 2019; Indiana University of Pennsylvania, 2019). Although the specifics of cohort-based programs vary across institutions, some entail students passing through several “research rotations” before selecting the mentor they find best suited to them (e.g., University of Florida Graduate Program in Biomedical Sciences, 2019).

Training and Tools Used by Graduate Admissions Committees to Support the Admissions Process

Previous researchers have identified the need to make the graduate admissions process more structured by providing information about the context needed to appropriately evaluate applicants, sequencing of materials for application file review, and the use of rubrics to allow for more transparency and consistency (Kent & McCarthy, 2016). In recent times, there has been a strong call from various researchers (e.g., AAMC, 2014; Diminnie, 2012; Kent & McCarthy, 2016; Marny & Roe, 2004; Posselt, 2015, 2016) to put practices in place that provide training for faculty and staff involved in the review of graduate admissions files for making decisions about whom to admit to the various programs.

Our review of the literature found no articles primarily devoted to the training of graduate admissions committee members. Most articles about the graduate admissions process remain silent on the matter, yet there seems to be a multitude of reasons why it is desirable and makes sense to train graduate admissions committee members. For instance, the Council of Graduate Schools (Diminnie, 2012) recommended that all committee members be trained in order to identify fraudulent applications, such as those that may have been completed by someone besides the applicant. They also encouraged interviewers to be trained on which interview questions are permissible, so that no legal issues ensue as a result of asking unacceptable questions. Additionally, the Council noted that evaluating international credentials requires special training, because reviewing foreign transcripts can be challenging in terms of ensuring “degree equivalence, grading systems and quality of the institution” (Diminnie, 2012, p. 22). Another reason to encourage training is that committee members might feel uncertain about some parts of the admissions process, such as how to use GRE scores or percentile rankings in their analysis of applicant materials (Posselt, 2016), how to review applicant files, or what to look for in a personal statement. Without training, committee members may be more prone to bring personal biases into their admissions decision-making (Gartner, 1986; Posselt, 2016). Additionally, one institution gave an anecdotal account of being threatened with legal action by a student who was not admitted to the program (Perkins & Lowenthal, 2014). Luckily, the program could show that all application materials were evaluated fairly. Showing how training helps to make the admissions process systematic would be helpful in such situations, rare as they are.

Lack of training for admissions committee members could potentially detrimentally affect the admissions process, and it would be worthwhile to research the extent to which negative consequences occur. Further, training committee

members how best to conduct various admissions procedures, including the appropriate use and weighting of GRE scores in decision-making, would be worthwhile. Although the *GRE Guide to the Use of Scores* (ETS, 2017b) provides guidelines about appropriate score use, studies have shown that many programs are not familiar with the GRE score use guidelines, are weighting the GRE General Test heavily, and when faced with reviewing large numbers of applications, use the GRE General Test with a cut score as an initial screening criterion to narrow down the pool of applicants (Kent & McCarthy, 2016; Klieger *et al.*, 2017; Posselt, 2016). In addition, both Klieger and colleagues and Posselt have identified that this practice is more common in STEM-related fields. Various researchers (e.g., Kent & McCarthy, 2016) have recommended that graduate faculty be provided with information on the appropriate use of GRE scores. Although this information is available on the ETS GRE Program website, it is still common practice for programs to use cut scores on the GRE tests as a way to manage the large number of applicants who may have applied to a graduate program (Klieger *et al.*, 2017). This seems to indicate that merely having the information on the website is insufficient. More explicit guidance and training is needed on how to appropriately interpret and use GRE scores in the admissions process.

With respect to the use of tools to facilitate and structure the admissions process, the most frequently cited tool was the use of a scoring rubric. The Council of Graduate Schools (Diminnie, 2012) encouraged the use of a scoring rubric when conducting interviews so that applicants can be evaluated systematically and so that interviewer bias is minimized. Beyond interviews, scoring rubrics can also be applied to entire portfolios or files. In their comparative study of portfolios versus traditional admissions in predicting graduate student success at Chapman University, Dodge and Derwin (2008) referred to the use of a detailed scoring rubric that helps committee members to reliably score each portfolio using a 5-point scale on field relevant experience, degree expectations, general experience, graduate level writing, and analytical/conceptual ability. Similarly, an admissions committee member in the computer science department at Stanford University in 2010 described the committee's process in using a scoring rubric to assign numerical scores to each candidate's file. According to Raghunathan (2010, p. 8), "the committee is usually given a scale (e.g., 0–5, 1–10, etc.) and a mapping from different scores on that scale to an English description of what an average applicant getting that score should be like. Using this legend as a reference, the score is awarded ... based on [the reviewer's] overall perception of the candidate, taking all factors into account." Another example of scoring rubrics was given by Perkins and Lowenthal (2014), who wrote that committee members for the Boise State University Educational Technology online doctoral program rate applicants' files using one scoring rubric and rate interviews using a separate scoring rubric.

Admitting Diverse Applicants

The authors of an Office of Civil Rights report (Boone, Young and Associates & ETS, 1984) published more than 30 years ago noted that minority recruitment, admissions, and financial assistance were the three pivotal factors that influence minority enrollment in graduate schools. It is interesting to see that some of the same issues raised in this 1984 report are true in 2019 regarding the structure, practices, and policies for graduate admissions and their impact on a graduate program's ability to reach its diversity goals. Increasing the diversity of graduate education remains a pressing concern, and contemporary researchers continue to note the value of increasing diversity within their programs, especially given the increasingly diverse nature of the U.S. society (e.g., AAMC, 2014; Garcés, 2014; Mamary & Roe, 2004; Miller & Stassun, 2014; Posselt, 2016; Scott & Zerwic, 2015). Indeed, in 2009 the Council of Graduate Schools reported that there is still a dearth of underrepresented minorities in graduate education in the United States. In fact, only 12% of the total research doctorates awarded in 2006 were awarded to underrepresented minorities.

The Office of Civil Rights (Boone *et al.*, 1984) report highlighted the fact that those involved in admissions decisions at the time knew that using standardized test scores in isolation from other admissions criteria was inappropriate (e.g., can disadvantage members of underrepresented groups) and that they often assumed that tests can do things that even the developers of the standardized tests never intended them to do (Boone *et al.*, 1984). Then, as now, it was recognized that admissions faculty's application of inappropriate GPA and/or GRE score cutoffs could limit the opportunities of underrepresented minority applicants to have the entirety of their applications reviewed and that fuller attention would have to be paid to all aspects of applicants' files in order to build graduate classes more representative of the population of the United States. Part of the current emphasis on holistic review is that the practice is recognized to be a promising means of achieving this goal (Kent & McCarthy, 2016). ETS (2016), in *A Balanced Approach to Score Use*, affirmed this perspective and reinforced the general message that adequate decision-making during graduate admissions can occur only when multiple pieces of information about applicants are considered and GRE cutoff scores are disallowed.

Consideration of social and emotional skills is one means of ameliorating group differences in graduate admissions. Although researchers have found gender differences in personality ratings (see Feingold, 1994) both in U.S. samples and across cultures—including that gender differences are generally more pronounced in U.S. and European samples in comparison to Asian and African samples (Costa, Terracciano, & McCrae, 2001)—the dimensions related to the social and emotional skills of interest in graduate admissions (e.g., conscientiousness, openness) do not exhibit significant gender differences. Similarly, in terms of ethnic group differences, a meta-analysis of five U.S. subgroups (specified as White, Black, Asian, Hispanic, and American Indian) found that most group comparisons demonstrated negligible differences in personality ratings across dimensions and that any differences in certain groups were unlikely to lead to any form of adverse impact in selection (Foldes, Duehr, & Ones, 2008). In general, research supports the conclusion that assessments of social and emotional skills of interest for graduate admissions do not display substantial group differences in scores by gender or ethnicity and thus constitute a possible corrective for subgroup differences in cognitive test scores.

Graduate programs in states with laws that prohibit the use of race/ethnicity in admissions are particularly challenged in finding ways to identify students who will contribute to the diversity of their programs. In these cases, some graduate schools have begun to offer optional diversity essays as one way to identify applicants who share the graduate schools' and programs' commitment to diversity. Diversity essays ask applicants to write about how life experiences contribute to the social, intellectual, or cultural diversity within a campus community and a chosen field or which professional skills, experiences and/or willingness to engage in activities would enhance campus diversity and equity efforts. These essay prompts ask about the applicants' commitment to diversity but not necessarily the diverse backgrounds from which the applicants may come. In addition, the American Association of Medical Colleges (AAMC) 2014 has provided examples of the use of race-neutral dimensions of diversity that could be used in graduate admissions, such as applicants' socioeconomic status, parental educational attainment, geographic origin, and bilingualism—though it should be noted that many of these variables vary substantially across racial categories.

Bridge programs have been identified as another means for increasing the diversity in graduate programs, particularly science, technology, engineering, and mathematics (STEM) programs (Hodapp & Sparks Woodle, 2017; Stassun *et al.*, 2011). One of the more popular STEM bridge programs is the Fisk-Vanderbilt Master's-to-PhD Bridge Program (2017). The program admits students into a Fisk master's degree program in physics, chemistry, or biology. The key to the success of this bridge program is the terminal master's degree program at Fisk University, where students receive the academic and research training and support that will allow them to successfully transition to Vanderbilt's PhD program. In terms of the admissions process to the PhD program at Vanderbilt University, the candidate is evaluated on a scale from 1–4 on academic preparation, perseverance/fire in the belly, relevant research experience, leadership/outreach activities, and communication skills/presence/maturity. During the interview component, faculty look for a variety of indicators of success, including passion, strong motivation to succeed, intense drive, hard work, willingness to take risks, ability to overcome hardship, leadership capabilities, collaboration skills, and ability to succeed in the classes that serve as gatekeepers to the PhD (Stassun *et al.*, 2011). Although this is a special type of graduate program, the practices used in this bridge program can serve as a model for other graduate programs in terms of its use of an explicit rating scale that outlines the key indicators of interest, as well as an applicant interview protocol that is used by faculty participating in interviews. Yet in spite of the benefits of explicitly defining and measuring key qualities, given the limitations of both rating scales and interviews, it may not be realistic or goal worthy to infer a long list of qualities solely through these methods; programs may want to use these methods to assess a few qualities pertinent to them and use other assessments, such as performance-based measures, that capture the actual demonstration of some of the traits or abilities required within the profession.

The American Physical Society (APS) bridge program discussed by Hodapp and Sparks Woodle (2017) is an example of a professional organization identifying diversity as an organizational goal and implementing a program to enact change and actively achieve this goal. The APS bridge program provides an opportunity for underrepresented minority students who may demonstrate an interest in pursuing a PhD but who may need additional transitional support to gain entry into a physics PhD program. Hodapp and Sparks Woodle (2017) indicated that the APS bridge program connects students with “programs that are willing to look beyond GRE scores and that recognize and foster potential rather than just accomplishment” (p. 52). Although this article was written in the context of a STEM field, similar concerns have been observed across programs that are interested in increasing the diversity of their programs and their respective academic fields.

With goals of increasing diversity within graduate programs and better understanding of the link between admissions criteria and student success, programs find themselves in the midst of the *diversity-validity dilemma* (De Soete, Lievens, & Druart, 2012; Pyburn, Ployhart, & Kravitz, 2008). Although this term stems from the field of industrial and organizational (I/O) psychology, it also applies in the context of graduate admissions. The diversity-validity dilemma can be defined as the challenge of using assessments that have been found to be valid predictors of academic achievement but where users have consistently observed average performance differences between diverse groups on the assessment. As mentioned previously, diversity considerations have motivated some admissions committees to move to more holistic file review to facilitate diversity goals or to weight GRE scores and other admissions information differently for groups that, on average, score lower on the more quantitative admissions criteria, particularly the GRE General Test (Kent & McCarthy, 2016).

Areas for Further Investigation

This paper reviewed five major issues related to graduate admissions process: (a) the decentralized nature of graduate admissions, (b) the types of materials that are collected as part of the application process, including standardized test scores; (c) the variety of admissions models that are used to make admissions decisions; (d) training and tools used by graduate admissions committees to support the graduate admissions process; and (e) admitting diverse applicants. Each one will be discussed in terms of implications for future research.

The decentralized nature of graduate admissions has been raised as a possible contributor to the disconnect between the goals defined by the graduate school and decisions made in admitting applicants into graduate programs. The current contribution of the graduate school in the admissions process is more administrative in nature. Finding ways in which graduate school staff can be more directly involved in discussions related to graduate admissions decisions could help to bridge the gap. Some graduate programs have introduced organizational structures within the graduate school that allow for graduate faculty to have joint appointments as departmental faculty as well as within the graduate school administration (e.g., associate dean). This can be particularly helpful given that the faculty will have had direct experience in the admissions decision-making process and will be able to relate to the ongoing challenges faced by faculty within the programs. Even as these faculty take on responsibilities within the graduate school, it will be key for these graduate faculty to maintain their involvement in the graduate admissions process (even if only as an “active observer”) so that they can maintain their relevance within the graduate admissions process. Existing models of these kinds of structures should be identified and examined. Specifically, models should highlight best practices in joint graduate school and faculty contributions to the admissions decision-making process, as well as cultures that demonstrate the alignment between the goals of the graduate school and the practices within the graduate admissions committees. In general, research in this area is lacking, and more should be conducted on how the decentralized nature of the graduate admissions process may affect decision-making; studies should be done documenting the changes that occurred in admissions and enrollment trends in the wake of the introduction of organizational structures more closely linking graduate programs and the graduate administration.

As has been previously mentioned, the most common types of materials that are submitted by applicants are the traditional components such as transcripts, standardized test scores, letters of recommendation, personal statements, writing samples, and resumes. However, it has become increasingly clear that admissions committees are looking for more information, particularly information about the social and emotional skills of their applicants. Based on the materials that are available to them, admissions committees try to glean this information from letters of recommendation, personal statements, and interviews. However, without explicit indicators of the types of social and emotional skills admissions committees are looking for, there will continue to be a desire to have information about the applicant that may or may not appear in the application materials. Admissions committees need to put processes in place before an admissions cycle begins to make explicit what the committee members should be looking for within each component of the application to ensure that the applications are being evaluated fairly and consistently. There is a clear need for the identification of the types of social and emotional skills that graduate programs are interested in as they make admissions decisions. Along with the identification, there also need to be clear definitions of these constructs so that measures can be developed. Clearly defined constructs and measures that are explicitly designed to support the admissions decision-making process will help to ensure that the measures validly and reliably measure the constructs of interest.

Additionally, although there is a body of research that demonstrates validity evidence for GRE scores as a predictive tool for multiple performance criteria, researchers have highlighted difficulties in drawing conclusions from GRE validity

research by noting restrictions in the samples used in much of this work. Specifically, studies that make use of samples with only admitted students do not account for the scores of applicants who were denied admission, which can result in range restriction issues for prediction (Hunter, Schmidt, & Le, 2006). In addition, there is still a paucity of research demonstrating GRE General Test validity over multiple time points and with the most recently released version of the GRE General Test. More studies are needed to examine validity evidence over time and with the most current version of the assessment. Given the limited number of studies demonstrating validity evidence for predicting multiple success criteria for the most recent version of the GRE General Test in U.S. graduate institutions, there is still room for studies that provide extra insight into the predictive validity of the assessment and, in turn, its utility for making admissions decisions for specific graduate programs.

We believe that the graduate admissions process needs to be made more explicit. Before the graduate admissions cycle begins, the appropriate training and tools should be put in place to ensure a graduate admissions cycle that has processes that are aligned with the graduate school and its graduate programs' desired outcomes. Training provided to faculty to support their participation on academic search committees can be used as a model for the types of training that can be held for graduate admissions committee members. For example, training related to implicit bias has been identified as a critical area that can help change institutional culture and identify ways to change current institutional processes to better meet institutional diversity goals related to equity in gender and race/ethnicity (Carnes *et al.*, 2012, 2015; Mamary & Roe, 2004).

As previously mentioned, although the application materials are ones that admissions committees commonly receive, there are varying degrees of familiarity with the information that is provided in the application, from evaluating applicants' transcripts from colleges and universities that are unfamiliar to the committee members, to interpreting and appropriately using standardized test scores, to placing more value on letters of recommendation from letter writers with whom they are familiar or are from well-known institutions without consideration of the applicant's opportunity to obtain such a letter. The responsibility for this training falls on everyone involved in the graduate admissions process—the graduate school, the developers of the tests used in graduate admissions, and the faculty responsible for making admissions decisions. Enough stakeholders have raised questions and concerns about the current process for making graduate admissions decisions that this should serve as a call to action for all involved in the process. The first step in making the process more explicit and developing the appropriate protocols and rubrics, as well as other tools, is to initiate reflective conversations about the current process and begin evaluating whether the current process is explicit enough to impact the goals of the graduate school and its programs. Existing protocols that have been used by researchers in their examination of the graduate admissions process can help facilitate these much-needed conversations (e.g., AAMC, 2014; Kent & McCarthy, 2016; Posselt, 2016; Stassun *et al.*, 2011; Urban Universities for Health, 2014).

Judgment and decision-making are at the heart of what occurs during the graduate admissions process. However, the results of our literature review have found little to no experimental studies that apply principles of judgment and decision-making to examine the effectiveness of the graduate admission process. Chi (2006) reported that experts have difficulty making accurate predictions about the performance of novices in their fields, and various researchers have found the use of statistical models to be more accurate than more subjective judgments (Grove, Zald, Lebow, Snitz, & Nelson, 2000; Kuncel, Klieger, Connelly, & Ones, 2013; Meehl, 1954). However, as King *et al.* (1993) have noted and is currently the case, there is a long way to go before a good enough statistical model that can be solely relied upon for making admissions decisions is available. Nonetheless, current processes can still be improved by increasing the breadth of information available to faculty evaluators to include both the cognitive and social and emotional skills in statistical models and developing models that parallel the procedures that are used by admissions committee members.

There are clearly challenges in achieving diversity goals, particularly when the first question asked in a diversity-related discussion is what is meant by diversity. So, a first step is for graduate schools and individual programs to define diversity, with an understanding that the definitions may differ. In addition, legal considerations about the role that race/ethnicity can (or cannot) play in making admissions decisions also needs to be made clear from a procedural perspective (i.e., given that graduate schools have goals to increase the percentage of students from underrepresented groups and cannot use race and ethnicity as factors in making admissions decisions, how do they achieve this goal). Although being a member of an underrepresented minority group is one aspect of diversity, some graduate schools, particularly those in states that have laws against using race and ethnicity in admissions, have added diversity essays as a component of the application. These

diversity essays ask applicants to write about their experiences with diverse communities and the impact those experiences have had on their own point of view and their commitment to diversity.

Governmental agencies such as the National Science Foundation (NSF) and the National Institutes of Health (NIH) have provided funding to support goals of increasing the percentage of underrepresented minorities within science, technology, engineering, and mathematics (STEM) fields. NSF programs such as Inclusion Across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (NSF INCLUDES), ADVANCE: Organizational Change for Gender Equity in STEM Academic Professions (ADVANCE), and the Alliance for Graduate Education and the Professoriate have provided graduate institutions with possible funding opportunities. The funding opportunities allow for institution-specific approaches that may span the graduate enrollment process, which includes admissions. NIH also has comparable funding opportunities, such as the NIH Diversity Program, Enhancing the Diversity of the NIH-Funded Workforce Program, NIH Broadening Experiences in Scientific Training, and the NIH Building Infrastructure Leading to Diversity Initiative. Although not directly related to the admissions process, whether an applicant decides to apply and become part of the pool of applicants considered for admissions, the types of diversity-related initiatives can have an impact on attracting students who are from diverse backgrounds and who understand and appreciate the value of diversity in higher education.

Conclusion

This literature review has focused on the graduate admissions process. Professional programs such as business schools, medical schools, and law schools were generally not considered in this literature review. The admissions practices in professional programs are markedly different than the programs within graduate schools. In addition, professional programs tend to follow a cohort-based model of admissions and have a centralized admissions process, both of which are quite different from the admissions models used by graduate schools. Along the same lines, this review did not include research related to undergraduate admissions. Although professional programs and undergraduate programs were not included in this review, the authors acknowledge that there are lessons that can be learned and perhaps applied to the graduate school process, particularly as it relates to reviewing large numbers of applications with limited staff or faculty to review the applications.

This review does not focus on the students' perspectives and their knowledge of the admissions process and how admissions decisions are made in the graduate programs to which they are applying. There is limited information about applicants' perception of the weight that is applied to the application components during the admissions process (although see Powers & Lehman, 1983 for a study addressing this topic) and a disconnect between what faculty value as important and what applicants perceive to be the most important components of the application. Also, there is a need for students to understand what experiences are valued and how to talk about those experiences through their personal statement and considerations about whom they ask to provide letters of recommendation, including points they want the recommender to make so that the review committee can get a sense of multiple aspects of the applicant.

This literature review highlights the continued need for nationwide conversations about the graduate admissions process and ongoing research to evaluate current practices. These will be difficult conversations that will require all stakeholders to review current practices in graduate admissions, ask how those practices are aligned with graduate schools' and programs' goals and objectives, and make explicit the process by which admissions committees make their decisions. Through continued discussions regarding graduate admissions, the entire graduate enrollment process can begin to become better aligned to achieve the best possible outcomes for applicants to graduate school and eventually, the fields into which their graduates enter.

Notes

- 1 In particular, a relatively recent meta-analysis by Kuncel *et al.* (2010) investigated over 100 studies using data from both master's and doctoral programs. As noted in Wendler and Bridgeman (2014), this meta-analysis addresses certain weaknesses from previous research by examining predictive results across various graduate school disciplines, correcting for statistical artifacts in previous work, and making use of multiple predictors and criteria. Results demonstrate strong prediction of first year and overall graduate GPA for both master's and doctoral degree students using GRE Verbal Reasoning and GRE Quantitative Reasoning test

scores. GRE Verbal and Quantitative Reasoning scores also predicted faculty ratings of graduate student performance in both master's and doctoral programs.

- 2 The PPI was used by only a few institutions and is no longer offered by ETS.

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