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Graduate Education and Social Stratification

Julie R. Posselt¹ and Eric Grodsky²

¹Rossier School of Education, University of Southern California, Los Angeles, California 90089

²Department of Sociology, University of Wisconsin–Madison, Madison, Wisconsin 53706

Abstract

Graduate and professional education play an increasingly important role in economic inequality and elite formation in the United States, but sociologists have not subjected stratification in and through graduate education to the same level of scrutiny recently applied to undergraduate and sub-baccalaureate education. In this review, we discuss how prominent stratification theories might be extended to studies of the role of graduate and professional education, and we review research about stratification at junctures along student pathways into and through postbaccalaureate education to the labor market. Especially in doctoral and professional education, we find persistent stratification, including pronounced educational inheritance and disparities in participation and degree attainment by race/ethnicity and gender. We propose future directions for inquiry, highlighting unanswered questions and conceptual issues concerning how the field of and pathways through postbaccalaureate education contribute to social stratification.

Keywords

graduate education; higher education; inequality; professional education; sociology of education; stratification

INTRODUCTION

The educational system figures prominently in accounts of status competition and social stratification, including canonical publications in status attainment (Blau & Duncan 1967, Sewell et al. 1970) and critical studies of schools and schooling in social reproduction (Bourdieu & Passeron 1990; Bowles & Gintis 1976, 2002). Sociologists have considered how structural, organizational, and social relationships shape processes of stratification, from elementary school (Barr & Dreeben 1983, Dreeben 1968) to high school (Coleman 1961, Gamoran 1987, Oakes et al. 1992) and into higher education (Alon 2009, Armstrong & Hamilton 2013, Brint & Karabel 1989, Gerber & Cheung 2008, Stevens et al. 2008). Rarely, however, have we taken seriously the role that graduate and professional education may play in social stratification, including who seeks and obtains graduate credentials and what benefits those credentials confer on those who hold them. The purpose of this review is to examine the literature and evidence on the role of graduate education, as a system, in reinforcing, reflecting, and/or reducing inequality.

Several factors compel us to subject graduate and professional education to the same scrutiny that sociologists have applied to elementary, secondary, and undergraduate education. These factors include the rise in the number of people who hold graduate and professional credentials; the increasingly disparate economic resources that accrue to those with and without graduate credentials; and the growing recognition that, far from being a site of social equality, graduate and professional credentials are substantially more heritable than are other levels of education. Our review begins by discussing these motivations for attending to graduate education and describing the relevance of core stratification theories. Most of the review is dedicated to documenting patterns of socioeconomic, racial/ethnic, and gender stratification at key junctions along the pathway into and through graduate education—including application, admission, enrollment, degree attainment, and labor market outcomes. We look at heterogeneity in these trends by degree and field of study and conclude with a synthesis of promising directions for future theory and research.

We focus on graduate education in the United States, given substantial differences cross-nationally in the selection mechanisms, participation patterns, requirements, and returns to post-baccalaureate education. We do not discuss science, technology, engineering, and mathematics (STEM) degrees as a separate arena of competition, given the wealth of prior literature on this topic¹ and the fact that STEM degrees constitute only around 15% of recent graduate and professional degrees awarded.² Finally, although our interest is in issues relevant for sociology, we also draw research from economics, psychology, and education.

THE INCREASING RELEVANCE OF GRADUATE AND PROFESSIONAL EDUCATION

The share of Americans aged 40–55 with graduate credentials has changed only modestly over the past decade (steady at 1.5% for PhD or professional degrees and inching up to just over 8% for master's degrees), but the number of degree holders has increased appreciably (Ruggles et al. 2015). Between 2000 and 2013, total graduate and professional degree enrollment increased by approximately 35%, from 2.2 to 2.9 million students (Kena et al. 2016). Excluding professional degrees, data from the Council of Graduate Schools indicate that, in 2013, more than 1.7 million students enrolled in US graduate programs and more than 627,000 degrees were awarded that year (Allum 2014). Figure 1 displays field-specific, longitudinal trends in master's degree attainment, which has more than doubled in several fields. International students, whose share of doctoral degrees awarded in the United States has more than doubled over the last 40 years (Allum 2014), have certainly contributed to the rising number of US graduate and professional degrees awarded.³

Furthermore, the economic returns to graduate credentials constitute a nontrivial—and increasing—portion of the returns to higher education more generally. Since the 1990s,

¹There is a well-developed literature, going back to Merton (1968), on the careers of scientists that focuses in part on graduate training in STEM fields. For more recent treatments of the topic, see Xie & Achen (2009), Xie & Shauman (2003), and Xie et al. (2015).

²Our calculations are based on data published by Kena et al. (2016, table 318.45).

³Our focus on graduate education in the United States also precludes a full discussion of important trends that are unique to international students, such as their growing pursuit of graduate and professional education worldwide, heterogeneity in postgraduate degree migration, and the effects of their migration decisions on the US job market.

economic returns to college have increased modestly compared with the returns to graduate and professional degrees (Lemieux 2008, Valletta 2015). The earning advantage of college graduates over high school graduates increased only 6% from 2000 to 2013 versus a 17% increase in the relative earnings of those with a graduate degree (Valletta 2015). Among women aged 40–65 in 2012, those with a master’s, doctoral, or professional degree enjoyed median salaries 25%, 60%, and 108% greater than those of bachelor’s degree recipients, respectively. Among similarly aged men, the benefits of advanced degrees over bachelor’s degrees for median salaries were 17%, 30%, and 100% (NSF 2013).

In addition to their higher incomes, people who hold graduate and professional degrees are increasingly overrepresented among the wealthiest Americans. Between 1989 and 2010, the share of people with a master’s degree or higher in the top 5% of the wealth distribution rose from almost 30% to around 45%. People with a professional or doctoral degree are mostly responsible for driving this trend (Thompson 2013), and their share of the top 1% of the income distribution is greater still at 62% (Keister 2014). If we want to understand the power elite of this country, as Khan (2012, p. 361) argues sociologists must if they are to appreciate “the changing nature of American inequality,” then we need to understand the pathways of those who earn graduate and professional credentials.

Finally, although past research suggested that social origins do not influence the economic and occupational outcomes of those who attain a baccalaureate (Hout 1988, Stolzenberg 1994), more recent scholarship demonstrates that this is no longer the case (Laurison & Friedman 2016, Torche 2011) and that the role of social origins may vary by level of graduate degree and field of study (Mullen et al. 2003, Perna 2004). In fact, social origins continue to stratify destinations among the one in three college graduates who earn a postbaccalaureate credential. Trends in graduate and professional degree attainment differ by parental education, race/ethnicity, gender, and national origin. For example, Figure 2 shows the representation of graduate and professional degree recipients with varying levels of parental education. For both doctoral and professional degrees, but not master’s degrees, educational inheritance is striking. People whose parents have subbaccalaureate levels of education are underrepresented among those with doctoral and professional degrees, and those from homes in which the more educated parent had a doctorate or professional degree are increasingly overrepresented [according to our analyses of data published in the National Survey of College Graduates (NSF 2013)]. The most recent estimates indicate that children of like-educated parents are three or more times as likely to attain that credential as they would be if parental education and degree attainment were independent. These calculations are consistent with those by Torche (2011), who found evidence of educational inheritance for those who earn doctoral and professional, but not master’s, degrees.

Attainment trends differ by gender as well. For example, women increased their shares of degrees awarded at each level of graduate education from 1992 to 2014. By 2014, the percentage of women who earned master’s degrees exceeded that of men (at just over 9%), and women approached men’s rates of attainment at the professional and doctoral levels. Gender differences in the median age at most recent graduate degree have also declined. The median age for terminal degrees for women declined from 35 in the 1970s to 27 in the 1990s, whereas for men over the same period the median age at final degree stayed between

28 and 30. This convergence suggests that differences in labor force continuity between men and women who ultimately pursue advanced degrees have dropped, a trend with important implications for total economic returns to education. Graduate education may thus be linked to stratification through the association of ascriptive attributes with who earns graduate credentials, when they do so, and what the economic and social consequences are of obtaining these credentials.

EXTENDING THEORETICAL PERSPECTIVES TO GRADUATE EDUCATION

Although postbaccalaureate education has received relatively little sociological attention, theories developed to understand vertical and horizontal stratification at the undergraduate level can be extended to understand opportunity and attainment at the graduate level. Human capital theory offers a straightforward account of both selection into and rewards for graduate and professional education: To undertake the skill investment required for some forms of labor, the expected returns must outweigh the costs. In contrast to the technical orientation of human capital theory, sociological rational action theories—including maximally maintained inequality (MMI), effectively maintained inequality (EMI), and relative risk aversion (RRA)—treat education as primarily a positional good (Triventi et al. 2016). These theories originated in sociological studies that sought to account for the apparent decline in effects of parental education across educational transitions, as well as persistent stratification in the presence of educational expansion (cf. Breen 2010, Breen et al. 2009). Furthermore, through scholarship of the professions, including Weberian insights about social closure, we can conceive of postgraduate credentials as one means by which elites seek to legitimize exclusion, reduce the supply of labor in their fields of expertise, and thus drive up their compensation (Collins 1979). Finally, reproductionist scholarship in the tradition of Pierre Bourdieu illuminates processes through which status competition is enacted in institutions of higher education. To ground our review of the empirical literature, we review these theories and propose extensions to graduate education.

Human Capital

Human capital theory was developed to account for “paradoxes and puzzles” related to economic growth (Schultz 1961), including variation in individual wages and the excessive rate of national income growth relative to the store of physical resources in a nation. According to human capital theory, the answer to these puzzles lies in the investments people make in their own skills. Education has been construed as an investment in general human capital (productive skills that transcend the boundaries of firms, industries, and occupations) (Becker 1962, Weisbrod 1962), but specialized training provided by graduate and professional schools also contributes to field-specific forms of human capital such as business administration, classroom management, and law. The general skills of people with postbaccalaureate credentials may also offer a stronger, more efficient complement than bachelor’s degree-level education as workers adapt to technological innovations in the labor market (Lindley & Machin 2013).

Maximally and Effectively Maintained Inequality

Sociological theories of rational action neither reject the claim that education enhances productivity nor regard it as central to social stratification. One important variant of rational action theory, MMI, was originally proposed by Raftery & Hout (1993) to account for an apparently counter-intuitive finding about stratification in Ireland: Class differences in the odds of participation in secondary education changed little when mandatory attendance fees, thought to be a barrier to disadvantaged youth, were removed. Furthermore, these authors noted that the coefficients for parental education on the odds of making educational transitions were at a maximum for the transition into secondary school and progressively decreased for secondary school completion and university enrollment. Raftery & Hout (1993) argued that these patterns were consistent with a rational actor model in which students (and their parents) make educational continuation decisions based on expected costs and benefits, with those from more advantaged origins experiencing fewer barriers to educational success. The only scenario under which the relative odds of enrollment across social origins would change, they reasoned, is one under which a transition is saturated by members of the advantaged class.

MMI has since been widely applied to patterns of stratification in educational attainment (Breen 2010, Shavit & Blossfeld 1993); Lucas (2001) has argued that social origins shape not only vertical differentiation, across levels of education, but also horizontal differentiation, across the quality or status of the educational experience at a given level. Curricular tracks, for example, become means of effectively maintaining inequality, as advantaged children and their parents seek qualitative advantages in educational transitions that are all but universally attained. Lucas (2001) considered ordinal transitions across grades (and into college) and, within the high school years, the level of mathematics in which a student enrolled. Other research has explored social gradients in the postsecondary institutions students attend, documenting stratification in attendance patterns across place (Shavit et al. 2007) and selectivity over time (Bastedo & Jaquette 2011, Grodsky 2007, Posselt et al. 2012).

Both MMI and EMI describe competition for educational advantages in which exclusion is de facto based on economic resources, skills, risk aversion, and changes in origin-specific marginal distributions of educational attainment. Extending these theories to predict stratification in graduate education shows that the transition to college in the United States is arguably saturated (at more than 80%) with people whose parents have baccalaureate or advanced credentials, but college completion rates for these relatively privileged youth have stagnated at 60% to 70% as recently as the high school class of 2004. This stagnation may buffer against increasing stratification through graduate degree attainment over time, although we are not aware of any research that has investigated these patterns.

Closure and Credentialing

Graduate and professional education may also be implicated in social stratification through occupational closure and de jure exclusion. Occupational closure via licensure or educational credentialing serves a manifest function of controlling professional quality, but it also reduces the supply of workers in those fields and thereby ensures that they will receive

higher status and salaries (Weeden 2002). Educational credentialing, measured as the percentage of people with some college, correlates at almost 0.5 at the occupational level with two other key means of occupational closure: licensure and association representations (Weeden 2002).⁴ Kleiner & Krueger (2013) estimated that approximately one in three workers is employed in an occupation covered by a licensure requirement, with greater shares of those holding graduate and professional degrees in such occupations (44%) than lower education levels. Exploiting state-to-state variation in licensing laws, these authors estimated that the returns to licensure are between 11% and 18%. Like Weeden, they concluded that “licensing policy enables the individuals in a licensed job to obtain a degree of monopoly control, or the ability to ‘fence out’ competitors for a service, which results in increased wages for licensed workers” (Kleiner & Krueger 2013, p. S188). Situated at the nexus of an education system that allocates credentials and a system of professions that requires them (Abbott 2014), graduate and professional education institutionalize professional closure and, thus, indirectly contribute to stratification.

Status Competition and Social Reproduction

Theories of closure in the professions lend themselves to an understanding of how microclasses hoard resources through rational, strategic action. Bourdieu offered a complementary cultural explanation for stratification, conceiving of classified educational and professional credentials as forms of institutionalized cultural capital sought for both their status and economic returns. This conception leads to a theory of social, rather than occupational, closure. Bourdieu (1984) and Bourdieu & Passeron (1990) argued that in credential-based societies, education systems select and promote students according to implicit and explicit forms of social and cultural capital that favor students who already hold considerable social privilege. Schools graduate these students with academic classifications (i.e., degrees, professional licenses) that are replete with elite social and cultural capital and thus carry value in the labor market (Swartz 2012). Bourdieu argued that, whereas modern societies view direct selection on pedigree as illegitimate because it conflicts with the vision of an open opportunity structure, they can freely cloak personal pedigree with academic pedigree to produce workers who are ostensibly hired for their professional merits (Bourdieu 1984). Higher education thus becomes implicated in reproducing social stratification.

The same dynamics of status struggle that Bourdieu considered formative in access to elite education at earlier levels may also shape participation in graduate and professional education. The terms of admission to elite graduate degree programs have become terrain on which status competitions are waged and elites achieve social closure. Furthermore, doctoral education represents a link between selection processes in schools, which determine educational attainment, and those in the academy, which determine who become leading scholars. The definition of elite social and cultural capital may thus become intertwined with the definition of scholarly excellence, determining access to the top strata of education and to faculty positions.

⁴More prestigious occupations benefited from the establishment of licensure earlier and enjoy licensure protections across a wider range of states than do less prestigious occupations (Zhou 1993).

Each of these theories may plausibly help explain patterns of stratification in graduate and professional education participation and the returns to completing advanced credentials. Among them, human capital and EMI/MMI hold significant promise for individual-level analysis through their accounts of what motivates graduate/professional education pursuit and the returns that graduates realize to their degrees. By contrast, to answer broader questions about graduate education's role, as a system, in the social and professional closure processes that contribute to economic stratification, the literature on credentialing is vital. Finally, theory and research on status competition and social reproduction make plain the powerful role—which is implied, but not always explicit in EMI/MMI frameworks—that protecting status plays in the pursuit of advanced education. The breadth of research questions about graduate education relevant to stratification processes and outcomes means that sociologists committed to understanding these issues will no doubt find themselves in conversation with a variety of theories.

STRATIFICATION ON THE PATHWAY TO AND THROUGH GRADUATE EDUCATION

In contrast to the well-developed literature on pathways to college (Grodsky & Jackson 2009, Hossler et al. 1999, Perna 2000), research on pathways to and through graduate and professional education is relatively sparse, with the exception of research on psychology and other STEM fields (Lowell et al. 2009, Xie & Killewald 2012, Xie & Shauman 2003) and, to a lesser extent, business (Dreher & Ryan 2002, Stolzenberg 1994). However, a growing body of social science research examines differential group outcomes at junctions along the pathway to graduate degree attainment (e.g., application, admission). Individual student choices at one point in time may condition future opportunities. These choices include initial college type (two-year, elite four-year, etc.); college major; time allocations to work, study, and other activities during college; timing of entry into the labor force; and family formation, among other things. Similarly, institutional choices (e.g., whom to admit, how much and what types of financial aid to award) affect opportunities and achievements at the master's level that may constrain students' options for PhD programs—and jobs—down the road. In the following sections, we review recent empirical literature published in sociology, education, economics, and psychology about these key choices: application and admission to graduate school; recruitment, matriculation, and enrollment; and degree attainment, labor market transitions, and their accompanying economic returns. As undergraduate education has recently been reviewed in this journal (Gerber & Cheung 2008, Stevens et al. 2008), we begin with the population that expresses aspirations or expectations for graduate education.

Aspirations, Expectations, and Applications

The population of US students eligible for graduate study has increased over time, with bachelor's degree attainment rising from approximately 5% of 25–29-year-olds in 1947 to more than 30% in 2013 (US Census Bur. 2015, table A1). Worldwide economic development and expansion in access to undergraduate education (Schofer & Meyer 2005) have also driven up demand from international students (Bound et al. 2009). Even before students reach college, though, their interest in postbaccalaureate education is widespread. Between 1976 and 1990, the share of US high school seniors expecting to attend graduate or

professional school increased from 29% to 46% (Reynolds & Johnson 2011). Fulfillment of these expectations eludes many. Reynolds & Johnson (2011, p. 93) found that only 40.8% of those who expected as high school students to attend graduate school did so by age 30. Adolescent girls have a 16%-lower likelihood than boys of meeting their graduate degree expectations, and adolescents with college-educated parents have twice the odds of fulfilling graduate degree expectations as those whose parents did not attend college (Reynolds & Johnson 2011). During their college years, both African American and white students' educational aspirations⁵ decline, on average (Carter 1999), a pattern due in part to evolving career objectives and a developing understanding of requirements for specific careers (Schneider & Stevenson 1999). However, among college graduates who expect to earn a doctorate, the odds of fulfilling graduate degree expectations are much better. According to data from the 1993 Baccalaureate and Beyond Longitudinal Study, more than half of the students in that group apply to graduate or first professional programs. Of those, 86.1% are accepted to at least one program, and of those, 67.9% enroll (Millett 2003).

Accumulating significant debt during the undergraduate years may deter some students from applying to graduate school, although the empirical record on this question has been mixed for more than 20 years. Most recently, English & Umbach (2016) found no associations between debt and aspirations, application, or enrollment, controlling for a wide variety of individual and institutional variables; however, two studies that employed propensity score matching found undergraduate debt negatively associated with graduate school pursuit (Chen & Bahr 2012, Malcom & Dowd 2012). Heavy debt appears to be an especially strong deterrent for first-generation college students (Chen & Bahr 2012) and for white and Latino students in STEM fields (Malcom & Dowd 2012).

Other factors associated with application to graduate school include family income, gender, race, marital status, and academic performance (Chen & Bahr 2012, Ekstrom et al. 1991, Mullen et al. 2003). Seibert et al. (2013) found that people with strong intrinsic career goals, who were dissatisfied with their careers, and who engaged in career planning were more likely to apply to full-time MBA programs. To our knowledge, Seibert et al.'s study is the only one to take up the important question of what drives midcareer professionals who enjoy full-time salaries to forego earnings in pursuit of graduate degrees.

Recent qualitative analyses of graduate school choice have sampled enrolled students only, allowing for limited inference,⁶ but have found common patterns—including strong support from family, peers, and faculty—in the success stories of graduate students from populations under-represented in specific sectors and fields (Dela Cruz 2012, McCallum 2012). Other research on graduate school choice has drawn from nationally representative samples, but the data are now somewhat outdated and rely upon surveys whose sampling designs excluded individuals who did not initiate their graduate degrees soon after earning the

⁵On the meanings of aspirations and expectations, Spenner & Featherman's (1978, p. 383) review in this journal noted, "Some research distinguishes between the stated choice of a goal when no constraints are placed upon it (aspiration) and the statement of a goal when such constraints are brought into consideration by or for the respondent (expectation). Aspirations are assumed to be more idealistic statements of desired objects of achievement, while expectations are interpreted as more realistic."

⁶Enrolled students' academic backgrounds, social origins, and motivations for graduate school pursuit are likely to differ systematically from those of individuals who did not apply in the first place, who applied but were not admitted, or who were admitted but opted not to enroll.

baccalaureate. For example, several otherwise-excellent studies of aspirations, application, and/or enrollment analyzed data from the 1994 and 1997 follow-up surveys to the 1993 Baccalaureate and Beyond Longitudinal Study (Heller 2001, Millett 2003, Mullen et al. 2003, Perna 2004). Replication studies with recent data and/or data including older graduate students could clarify self-selection into graduate school, as revealed in application behavior. If Ekstrom et al.'s (1991) and Millett's (2003) findings still hold about high rates of acceptance and enrollment for those who do apply, then the importance of understanding application patterns is clear.

Admissions

Conceiving of graduate admissions as organizational boundary work for knowledge and professional communities provides an intellectual point of entry for sociologists into the study of stratification. Studies of selective undergraduate admissions (Grodsky & Kalogrides 2008, Karen 2002, Stevens 2007) revealed that admissions is more than a task of spotting students with the strongest odds of academic success; higher education institutions also use admissions to create communities and enact specific organizational goals and identities. In doctoral education, the admissions process is a form of gatekeeping and closure for disciplines and professions (Posselt 2015a), the initial stage of the idealized “system of institutionalized vigilance” (Merton 1973) that faculty create through evaluation and peer review (Lamont 2009, Pontille & Torny 2010, Smith 2009). Both judgments of who merits admission and the contexts in which those judgments are situated (e.g., disciplinary cultures, decision-making practices, and institutional norms) link the sociology of stratification with sociologies of knowledge, evaluation, and science.

Admission rates to graduate programs indeed vary widely—by degree type and between and within institutions and fields of study. Figure 3 displays the heterogeneity in US doctoral and master's program admission rates, by universities' Carnegie classification and fields of study. The share of applications accepted ranges from a low of 13.4% in business doctoral programs to a high of 71.1% in education master's programs, and from a low of 19.1% of doctoral program applications in universities with very high research activity to a high of 61.8% of master's program applications in doctoral research universities. This variation makes it difficult to generalize about the extent to which admissions processes constrain the academic and professional pathways available to prospective graduate students.

In the research literature on graduate and professional admissions, most studies of admissions focus on either one or a handful of academic graduate programs or admissions within a particular professional field (e.g., JD, MD, MBA programs); few studies aggregate academic and professional admissions, which is perhaps wise given fundamental differences in their social organization. However, the foci of this research—which sometimes overlap—are remarkably similar: judgment and decision making, the role of race/ethnicity in admissions, models of admission outcomes, and the validity of admissions criteria. With scholarship on these topics dating back to the mid-twentieth century (Cureton et al. 1949), our review emphasizes foundational and current texts.

Studies of the Graduate Record Examination (GRE) dominate the literature on academic graduate admissions, as do studies of the Graduate Management Admission Test (GMAT) in

the business admissions literature (e.g., Hancock 1999, Oh et al. 2008) and the Law School Admission Test (LSAT) in law school admissions research (e.g., Kidder 2001). Motivations for this research typically stem from (a) concern about whether overreliance on test scores systematically biases the admissions process against underrepresented populations (e.g., Marston 1971) and/or (b) whether test performance serves as a valid predictor of subsequent academic performance (e.g., Newman 1968, Pennock-Roman 1990). GRE scores, for example, have statistically significant relationships with academic preparation, measures of general intelligence, and first-year graduate school grades, but also with demographic characteristics—a combination that makes weighing scores both rational for institutions, which seek students who will not struggle too much with early course-work, and also problematic for reinforcing social stratification. Distributional differences in the scores expected for admission to selective programs are particularly stark. In the physical sciences, only 26% of women test-takers and 5.2% of students identifying as black, Latino, and Native American scored above the median Quantitative GRE score for admission to physical sciences programs (i.e., 700 on the old scale), versus 73% of men and 82% of Asian test-takers (Miller & Stassun 2014).

Meta-analyses of the GRE's validity in predicting graduate student performance come to differing conclusions (Kuncel et al. 2001, Morrison & Morrison 1995), perhaps because few of the studies on which they are predicated have generalizable samples or methodologically rigorous designs.⁷ The most recent meta-analysis found that the predictive power of standardized exams for graduate and professional programs varies by type of test, by student outcome, and across groups of students (Kuncel & Hezlett 2007). Some studies find that test scores underpredict the performance of women (Young 2005) and that of older students (Brazziel 1992), for example, but others find no such evidence (e.g., Sireci & Talento-Miller 2006).

The validity of standardized tests has also been compared with that of other admissions criteria. MBA admissions research, for example, has considered work experience (Adams & Hancock 2000, Gropper 2007) and personality variables (Rothstein et al. 1994) as predictors of academic performance. In one or more fields, applicant grades, college quality (Attiyeh & Attiyeh 1997), perceived inter- and intrapersonal problems (Brear et al. 2008), letters of recommendation, having a master's degree (Bonifazi et al. 1997), research experience (Hines 1986), and disclosing a religious background (Gartner 1986) have been identified as correlates of admission decisions in one or more fields. Although there is some evidence of disciplinary variation in the correlates of graduate-level admission (Attiyeh & Attiyeh 1997) and in the decision-making processes and cultural logics (Posselt 2015b) that drive admissions decision making, recent quantitative research on disciplinary differences in admissions is all but nonexistent.

⁷Relatively few scholars have statistically corrected for attenuation of the correlation coefficient that is expected when measures have a restricted range (e.g., GRE scores among only admitted students), perhaps because the full population variance is unknown for key variables and/or the variables of interest have a covariance structure that differs for admitted and nonadmitted students. Furthermore, when predicting admitted student outcomes, few have utilized multivariate designs that control for characteristics of the educational contexts or experiences that graduate students encounter (e.g., availability of writing or statistical support, seniority of faculty advisor, type and/or amount of funding). Such factors are within the institution's control and may also correlate with how "successful" a student is.

Another common research topic with implications for stratification is how institutions define and seek diversity in graduate and professional programs—including whether and how faculty consider applicant race/ethnicity. Given the rise of diversity as an institutionalized value in higher education (Berrey 2015, Stevens & Roksa 2011), one might assume that applicants who contribute to a program’s racial/ethnic diversity have better odds of admission, all else equal. Research on law and medical admissions provides support for this proposition (Rothstein & Yoon 2008, Sander 2004, Dunleavy et al. 2013), including one study estimating that admitted African American law students had mean LSAT scores 1.4 standard deviations lower than those of admitted white students (Arcidiacono & Lovenheim 2016). In PhD admissions, Attiyeh & Attiyeh (1997) found an inverse relationship between the conditional probability of admission for individuals of a given race/ethnicity and the extent of that group’s overrepresentation within a discipline.⁸ One could also infer from Garces’s (2012) differences-in-differences findings of graduate and medical student enrollment, following affirmative action bans’ implementation,⁹ that when race can be considered, it provides underrepresented groups with a boost to their odds of admission.

By contrast, an audit study found convincing evidence of preferences for prospective graduate students who were white and male, especially in private universities (Milkman et al. 2014). And, through observations of doctoral admissions committees in a variety of disciplines, Posselt (2014, 2015b) found that diversity of any sort was introduced into deliberations only late in the admissions cycle, after applying very high thresholds for GRE scores and college grades, sometimes contextualized by college prestige. Even then, Posselt found, professors were usually reluctant to speak openly about race, gender, or socioeconomic status in their applicants and programs. These studies have clarified faculty judgment and decision making in the type of programs that produce professors in the academic core, but how admissions decisions are made in applied fields and less selective programs remains largely unstudied.

Student Recruitment and Matriculation

In academic graduate programs, faculty assume responsibility for selecting students and awarding aid, but rarely do they coordinate their efforts with those of university and graduate school administrators, who typically take responsibility for outreach and recruitment activities aimed at increasing the pool of minority and female applicants (Griffin & Muñiz 2011, Posselt 2015b). This disconnect undermines the efforts of both parties, and contrasts with the highly centralized social organization of enrollment management in most medical and law schools.

Surveys of admitted graduate students in the disciplines indicate that early contact with faculty (not graduate school administrators) is critical to their matriculation decisions (Bar et al. 2007, Bersola et al. 2014). Different factors motivate application and matriculation (Bersola et al. 2014), and the factors that shape matriculation vary by race/ethnicity. For example, the perceived quality of relationships within a graduate program and the

⁸Attiyeh & Attiyeh (1997) did not distinguish among master’s, doctoral, and professional degrees.

⁹The only field in which this trend did not hold was business, in which implementation of affirmative action bans was not associated with significant changes in graduate school enrollment.

organizational climate for inclusion were key determinants of matriculation for Latino and African American students, but not for Asian and white students (Bar et al. 2007). Taken together, these findings suggest that strategies for reducing inequalities through recruitment might include increasing coordination between administrators and faculty, increasing effort on the part of faculty, and/or increasing understanding by these parties of what students seek in graduate programs. The diversity management literature may also provide insight into alternative organizational arrangements and institutional practices (Dobbin et al. 2015, Kaley et al. 2006) for putting “diversity within reach” (Rivera 2012).

Enrollment

Graduate and professional degree programs enroll students at the end of a long process of social selection, posing a significant challenge for isolating causes of stratified enrollment and attainment outcomes. Enrollment is conditional on the outcomes of application, admission, and recruitment—as well as the myriad factors that affect each of these—so models of enrollment easily suffer from selection bias. The magnitude of this bias is far from clear, but likely varies by master’s, doctoral, and professional programs and by program prestige. For example, Ekstrom et al. (1991) and Millett (2003) found that most students who apply to graduate school, broadly defined, are admitted to at least one program, implying that selection into graduate programs often occurs through the process of application, not admission. This finding is in stark contrast to recent research confined to elite doctoral and medical school admissions, which has traced selection processes that exclude many who apply (Monroe et al. 2013, Posselt 2014). Much of the extant scholarship on graduate school attendance and degree completion collapses application, admission, and enrollment decisions into a single observable outcome: attendance.

A few scholars, however, have characterized gender and racial attendance disparities at the doctoral level as cumulative or secondary effects of life course decisions and educational achievements. Xie & Shauman’s (2003) analysis of trajectories in science and engineering found cumulative effects of college major and marriage choices, refuting the simplistic metaphor of a “leaky pipeline” to describe women’s persistent underrepresentation in some STEM fields, in doctoral education generally, and in scientific careers post-PhD. Women have higher odds than men of majoring in biological sciences, for example, but majors in those fields are 25% as likely as those in STEM fields like physics and engineering to persist through graduate education into science and engineering careers (Xie & Shauman 2003). Bowen & Rudenstine (2014) noted that African Americans and Latinos also disproportionately choose college majors that send smaller shares of students to graduate programs.

Similarly, social origin does not have a significant direct relationship with enrollment in graduate education, but parental education is indirectly related to doctoral and professional program enrollment via strong associations with prior academic achievement and characteristics of the undergraduate institutions (e.g., selectivity) that students from different social origins attend (Mullen et al. 2003). College selectivity emerges as a factor in other studies as well (Ethington & Smart 1986, Mullen et al. 2003, Zhang 2005) and is more strongly associated with doctoral than master’s degree pursuit (Zhang 2005). Graduate

school entry may be more dependent upon grades for men than women, and more dependent upon faculty and peer interaction for women than men (Hearn 1987).

In raw numbers, Latino and African American students remain underrepresented in many fields, especially in doctoral education. However, one recent study found that, conditional on a suite of academic and institutional factors, both groups have higher odds than white students of aspiring and applying to graduate education, and African American students are also more likely to enroll (English & Umbach 2016). Perna's (2004) analysis similarly traced racial disparities in enrollment to disparities in prior academic performance and financial resources, as well as to proxies for social and cultural capital.

Similar to the research on application, the generalizability of most findings about graduate school enrollment is hampered by the use of data collected well before the median age at which degrees are typically earned. What drives enrollment for students who pursue graduate education immediately following their bachelor's degree may systematically vary from those who seek graduate degrees to manage careers already in progress. Research to date gives us a good picture of the former population, but more work is clearly needed to understand the latter.

Persistence and Degree Attainment

Decades of research have analyzed the causes and consequences of PhD completion rates, which remain under 50% (see Bowen & Rudenstine 2014 for a recent review).¹⁰ The key question, stated plainly in the title of one paper, was "Who is responsible for graduate student attrition—the individual or the institution?" (Lovitts 1996). The first generation of research on doctoral student attrition grew out of the undergraduate retention literature which, inspired by Durkheim's study of suicide, asserted that social integration is critical to academic survival. Early doctoral attrition research emphasized student academic and background characteristics in relation to degree completion (e.g., Berg & Ferber 1983). However, an important large-scale quantitative study found that women who entered graduate education and did not complete the PhD had a higher mean grade point average (GPA) than men who did not complete (Lovitts & Nelson 2000). Moreover, despite their stronger academic performance, women left doctoral programs more often than men. The problem of doctoral student attrition, Lovitts & Nelson (2000) concluded, is not only one of students' ability to perform but also one of departments' ability—that is, their ability to retain women. Scholars subsequently turned their attention to students' interface with the cultures and structures of graduate education (Lovitts 2001, Strayhorn 2010) and the social and organizational contexts within which learning occurs (Ehrenberg et al. 2007, Golde 2005, Golde & Dore 2001).

In studies of graduate education in STEM, students' satisfaction with their faculty mentoring and peer relationships varies by gender and race (Gasman et al. 2008, Ong et al. 2011, Slay et al. 2016). Scholars have examined specific barriers encountered by graduate students who are female (Xie & Shauman 2003), the first in their family to attend college (Gardner &

¹⁰For robust seven-year and ten-year completion and attrition analyses of women and minority students in particular, see Sowell et al. (2015).

Holley 2011), African American (Johnson-Bailey et al. 2009), Latina (Espino 2014, Gandara 1995), and born outside of the United States (Lee & Rice 2007). Having documented these barriers, there is now a clear need to assess their potential consequences for well-being and degree completion and the efficacy of efforts aimed at reducing them.

Returns to Graduate Credentials

Pathways to and through graduate and professional education lead students to the labor market, and since the turn of the twenty-first century, the increasing fortunes of those who complete graduate credentials have been striking.¹¹ Much if not all of the increase in earnings of those with “college or more” education is due to increases in the compensation enjoyed by those with graduate or professional degrees (Autor 2014, Davis et al. 2015). Acemoglu & Autor (2012) concluded that the rising wages of people with postbaccalaureate credentials explains a sizable share of the increase since 1980 in wages for students who completed college versus those who did not.

Although mean levels of compensation for professional degrees are high, so too are the levels of debt that typical lawyers and doctors assume in pursuit of their credentials. Given that the typical law school graduate has debt of approximately \$105,000, Campos (2012) worried that, along with increases in postgraduate unemployment and underemployment, we now confront a crisis in legal education (but see Garth 2013). Greysen et al. (2011) voiced similar concerns regarding the field of medicine. Delisle (2014) estimated median total graduate and undergraduate debt for those who completed their graduate degree in 2012 at approximately \$141,000 for lawyers and \$162,000 for doctors. By contrast, Simkovic & McIntyre (2013) estimated that the net present value of a law degree exceeds its cost by several hundred thousand dollars. Whether and for whom professional education is a wise investment thus remain unclear,¹² but rates of default on loans are, perhaps surprisingly, lower for those with high levels of debt. Approximately 22% of students who rely upon loans for undergraduate education default, compared with only 7% of those who borrow for graduate education (Dynarski 2015).

Business cycles affect both attendance decisions of prospective graduate and professional students and the subsequent labor market experiences of those who choose to attend. Bedard & Herman (2008) found considerable variation in the responsiveness of graduate and professional school enrollments to unemployment rates, by undergraduate major, GPA, gender, and graduate program of study. Johnson (2013) found that these patterns also vary by gender. Lawyers (Simkovic & McIntyre 2013), economists from top doctoral programs (Oyer 2006), and Stanford MBAs (Oyer 2008) all show evidence of adverse effects of entering the labor market in a down economy. It is too soon to say whether or how these effects vary, or if they are as enduring as the scarring effects observed for those with less education. In sum, although we have identified clear relationships among credentials, labor

¹¹The literature on returns to education considers a broad array of individual-level benefits to educational attainment, including reduction in crime, increased health, lower mortality, better quality of life, civic engagement, and marriage. However, research on graduate education returns focuses exclusively on occupational and economic returns to postbaccalaureate credentials, and much of that literature considers specific fields of study (e.g., business, law, or medicine). For reviews of nonpecuniary returns to education, see Pallas (2000) and Lochner (2011).

¹²For research on returns to an MBA, see Arcidiacono et al. (2008).

market returns, and economic conditions, important questions remain about their relative strength in the stratification system and about nonpecuniary benefits to graduate and professional education.

HETEROGENEITY IN STRATIFICATION PATTERNS WITHIN GRADUATE EDUCATION

Before discussing directions for future research, we briefly review evidence of heterogeneity in key relationships described above. Patterns of participation and degree attainment and returns vary considerably by degree type, field of study, and institutional or program prestige. This variation carries ramifications for stratification because students from different backgrounds differentially select (and are selected into) degree types, fields, and programs.

Variation by Degree Type

Student background characteristics vary in their relationships with enrollment in graduate programs of varying types. Refining research by Stolzenberg (1994), and consistent with our own analyses portrayed in Figure 2, Mullen et al. (2003) found that parental education is associated not with MBA or MA enrollment but rather with enrollment in professional and doctoral education. Furthermore, parental education operates indirectly at the master's level through students' degree expectations and the quality of undergraduate institutions that students attend. Perna (2004) found that women are less likely than men to enroll in professional and doctoral degree programs but more likely than men to enroll in master's degree programs. Likewise, focusing on race and gender, Bowen & Rudenstine (2014) concluded that women, African Americans, and Hispanics are less likely to receive doctorates even after controlling for major choice and other important factors, including the composition of the international student population. Familiar lines of stratification thus seem to have softened at the master's level, but persist to varying degrees across fields at the doctoral and professional levels.

With respect to returns, within-credential variation in earnings increases with educational attainment (Carnevale et al. 2011). However, dispersion in adult life expectancy declines (Sasson 2016). Carnevale et al. (2011) reported that the interquartile range for lifetime earnings increases from \$1 million for students who completed high school to \$2.6 million for those who earn doctoral degrees and to \$4.5 million for those who earn professional degrees. As valuable as graduate and professional credentials are relative to baccalaureate and subbaccalaureate education, then, other factors also clearly contribute to economic inequality on the upper end of the education distribution. Xie & Killewald (2012) find heterogeneity in within-occupation earnings variability, for example. In occupations requiring professional degrees, which often aggregate diverse jobs into a single occupational category (e.g., management, law, and medicine), earnings variability is greater than it is within occupations in which expected training and tasks are more homogeneous (e.g., nursing, engineering).

Variation by Program Prestige

Doctoral and some professional degrees from higher-quality and higher-status programs appear to confer greater labor market opportunities; economic returns; and, among professors, scholarly outcomes (Braxton & Nordvall 1988, Waldinger 2010). Prestige hierarchies among graduate departments appear especially important for subsequent job placement (Burriss 2004, Clauset et al. 2015, Ott 2011, Oyer 2006). It is exceptionally difficult, however, to disentangle differences in the qualities of the students who enter these programs from differences in the benefits they enjoy upon completing their degrees. Who enrolls in higher-prestige programs? Few scholars have examined this question in recent years, but a spate of research studies in the 1960s–1980s found that prior academic achievement—indicated in college grades, admission exam scores (Astin 1993, Jencks & Riesman 1968, Lang 1984), and undergraduate institutional prestige (Lang 1987)—contributes to variation in the prestige of the graduate programs that students attend. As at the undergraduate level, where women are underrepresented in the most selective colleges and universities (Bielby et al. 2014), women remain underrepresented in more selective graduate degree programs (Mullen & Baker 2008). This pattern has continued despite a significant increase in women’s overall representation in undergraduate and graduate education (Stevenson 2009). Whether women’s underrepresentation in high-status graduate programs is due to self-selection and/or structural issues, however, has yet to be examined.

Variation by Field of Study

Men and women pursue increasingly similar graduate fields of study, although there remains substantial imbalance. Table 1 displays our calculations for change over time in the index of dissimilarity, a measure of what percentage of men or women would have to change fields to reach gender parity across majors.¹³ Among those who finished high school prior to the 1970s and went on to earn a terminal master’s degree, the index of dissimilarity was 50%, and it declined to approximately 40% over the 1970s and 1980s.¹⁴ Patterns trend toward more equitable gender distribution across fields for doctorates as well. Table 1 also displays representation across fields for African Americans and whites, and Hispanics and whites. The index of dissimilarity declines for Hispanics and whites at both the master’s and doctoral levels, connoting a trend toward gender equity for these groups. However, this consistent pattern does not hold for African Americans, whose index of dissimilarity hovers over time at 40% for master’s programs, worsens for doctorates, and improves for professional degrees.¹⁵

Dimensions of heterogeneity in graduate-level stratification patterns are thus a function of both group characteristics (e.g., gender, parental education, race/ethnicity) and contextual factors (e.g., field of study, degree type, program prestige, returns to education). As the

¹³The 2013 National Survey of College Graduates distinguishes among 140 fields of study at the bachelor’s, master’s, and doctoral levels and 13 fields of study for professional degrees (NSF 2013).

¹⁴Note that this finding differs from that of England et al. (2007), who report a fairly consistent index of dissimilarity by sex of individuals aged 35 to 39. The discrepancy may be a function of coding, as England et al. had to harmonize their data, or of the fact that their data refer to annual degree production rather than degrees held at one point in time across cohorts.

¹⁵Levels of dissimilarity in professional education are modest across the board, but this is largely a function of measurement. The National Survey of College Graduates distinguishes among only 13 professional degrees, roughly 90% of which are either medicine or law; we do not observe subfields of specialization.

foregoing discussion demonstrates, these dimensions often intersect. Their interdependence in shaping pathways— such as gender stratification in the fields of study that students pursue contributing to subsequent gender inequality in earnings of those with graduate degrees—amounts to greater complexity than is captured by a dichotomy of vertical and horizontal stratification. Multiple types of vertical and horizontal stratification simultaneously and interactively shape outcomes—for individuals and for groups. Torche (2011) and Xie & Killewald (2012) offer useful examples of the sort of fine-grained analysis that promises to advance our understanding of stratification in and stratification through graduate and professional education.

DIRECTIONS FOR FUTURE SCHOLARSHIP

Ongoing research in this vein is especially important because, despite the primacy of educational attainment in the process of social stratification and the well-developed state of the literature on this topic, we know strikingly little about how graduate and professional education contribute to processes of reproduction and social mobility. The time is right to move beyond top-coding education as “college or more” and conflating the benefits of college with those of graduate and professional credentials. A more sophisticated understanding—one that acknowledges stratification in participation, degree attainment, and both social and economic returns over the life course—will benefit the field. We see many paths forward and believe that the highly developed scholarship on baccalaureate entry and completion offers a useful road map for researchers.

Conceptualizing Student Pathways

We know relatively little about how baccalaureate recipients make choices about applying to and entering specific programs and fields of study, and how they conceive of the costs and benefits of earning graduate degrees—two pivotal topics that shape the temporal and institutional characteristics of student pathways. Likewise, we know almost nothing about how graduate and professional schools recruit students, and we understand the admissions process for only a subset of postbac-calaureate (mostly professional and academic doctoral) degree programs. Perhaps it is the limited research on topics related to the transition to graduate school that leads most scholars to default to a narrative of “continuation” from undergraduate education when describing it. What is clear is that the timing of entry into and completion of graduate degrees varies widely as a function of personal, social, and economic conditions, which in turn vary by sex, race/ethnicity, and prior educational experiences (Elman 2012, Elman & O’Rand 2004, Felmlee 1988, Jacobs 1996). For these reasons, educational continuation may not accurately portray pursuit of graduate education, especially for career-specific master’s degrees and among some racial/ethnic groups. Life course and career management perspectives may be even more important for understanding graduate education than for understanding earlier stages of the educational career.

Conceptualizing the Field of Graduate and Professional Education

Scholarship on higher education typically focuses on differences among credentials (certificates, associate degrees, and baccalaureate degrees) and, to a lesser degree, on distinctions among baccalaureate-granting institutions. Our review makes clear the need for

more empirical studies that consider how field of study and degree type intersect (Altonji et al. 2015, Eide et al. 2016, Webber 2016). Such connections may be even more important at the graduate level than they are at the undergraduate level. For example, the earnings and occupational experiences associated with the two most common master's degrees, the MBA and the MA in education, are radically different. This intuition is consistent with the substantially greater earning variation for people with graduate credentials compared with those with undergraduate degrees (Carnevale et al. 2011). It may be that talking about degrees, without reference to field of study, makes little sense conceptually or empirically in the case of graduate education.

Especially in professional education, prestige may be related to program focus. Different programs may have informal or formal charters granted to them by state coordinating boards, professional associations, or ranking systems; by their accreditation, mandate, or status, graduate programs are expected to create professionals prepared for specific occupational roles (Meyer 1970). For example, the State of California grants the University of California sole jurisdiction over public doctoral education in several professions. And across the country, institutions considered top schools in the professions offer degree recipients a competitive advantage in the labor market due to shared understandings of what it means to come from such programs. We know something of how undergraduate institutions position themselves using organizational sagas (Clark 1972) or institutional charters (Meyer & Rowan 1977), but nothing of how graduate programs prosecute such claims.

Conceptualizing and Measuring the Effects of a Graduate Degree

A third promising line of inquiry concerns the impact of graduate and professional education on degree recipients. It is unclear how much of the apparent labor market returns to selectivity and prestige at the graduate level are explained by the attributes of those who enter different programs of study and institutions, and how much of the returns are accounted for by the quality of instruction, networks, and cultural capital bestowed on graduates by their alma maters. Despite a steady stream of literature on college selectivity and economic returns (Brand & Halaby 2006, Dale & Krueger 2014, Rivera 2011),¹⁶ this is a virtually untapped topic on graduate education (but see Oyer & Schaefer 2009). Research on returns to graduate degrees that (a) accounts for pre-graduate school selection processes or (b) examines employers' interpretations of graduate credentials could help fill this void.

There is also clearly an opening for inquiry into nonpecuniary benefits of graduate degrees, including leadership opportunities, occupational characteristics, health, and well-being. Given the increasing share of the elite that holds a graduate degree, this research would complement that called for in the study of elites by Khan (2012) and of the wealthy by Keister (2014). Again, such research could build upon insights and evidence from existing scholarship about the effect of elite undergraduate education on outcomes across the life course.

¹⁶Gerber & Cheung (2008) provide a recent review of this literature.

Finally, and perhaps most fundamentally for a stratification research agenda, we need a better understanding of the role that graduate education plays in social mobility. As demonstrated in past research (Mullen et al. 2003, Torche 2011), graduate and professional education are a site of substantial social reproduction. They increasingly drive both labor market opportunities and the returns to college, and are associated with divergence in both the incomes and wealth levels of recent cohorts. This association may be further exacerbated by trends in assortative mating, leading to greater educational homogamy between couples at the lower and higher ends of the distribution of educational attainment (Mare 2016, Schwartz 2010).¹⁷ Our ability to understand social mobility and reproduction in contemporary America will therefore be appreciably enhanced by moving beyond “college or more” to an understanding of pathways into and through graduate and professional education, including the choices that students and institutions make along the way.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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¹⁷Although not an explicit object of study in the literature, assortative mating and the increased presence of women in post-baccalaureate education and the professions may compound the role of graduate and professional education in reproduction and perhaps in long-distance social mobility (e.g., Greenwood et al. 2014; Schwartz 2010, 2012).

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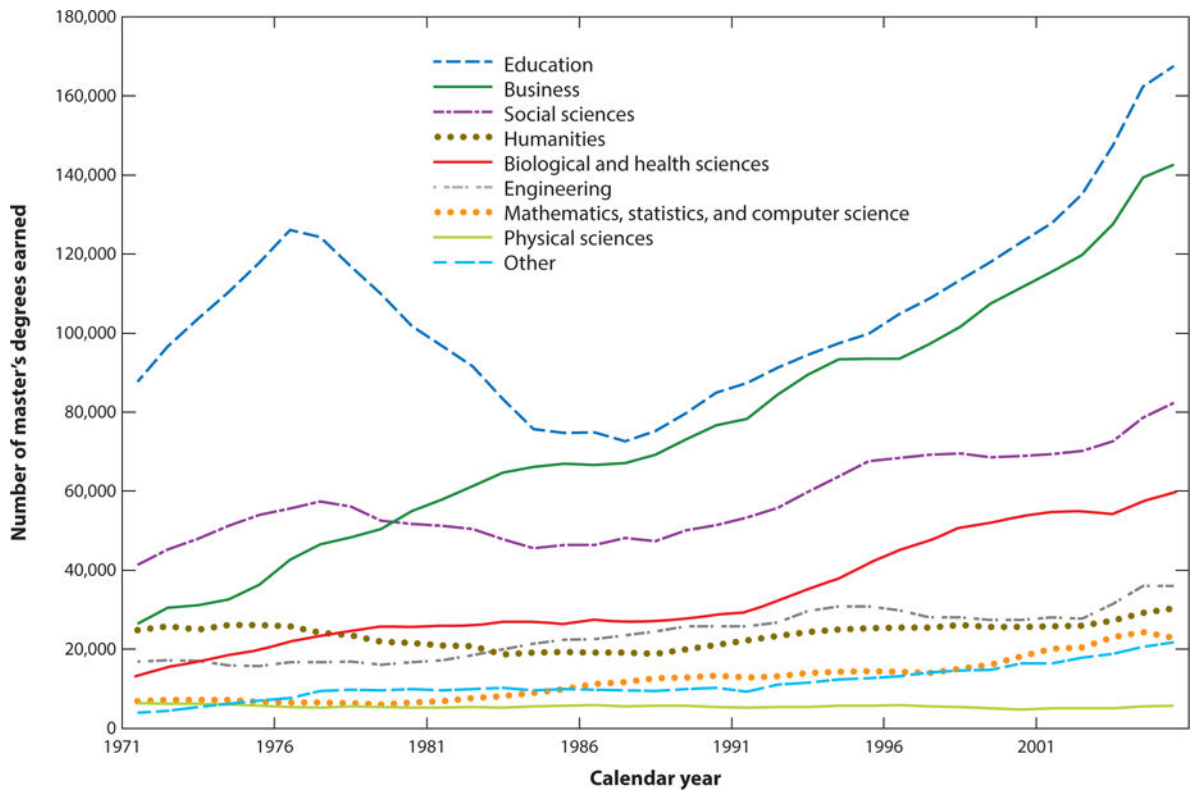


Figure 1. Master's degrees conferred by postsecondary institutions, by field of study. Data are from Digest of Education Statistics, US Dep. Educ. (2015).

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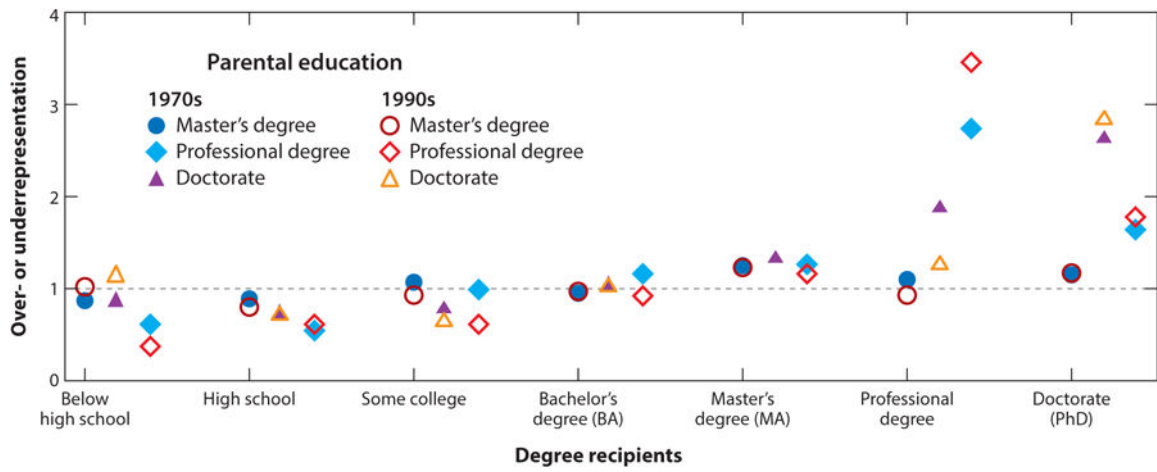


Figure 2. Over- and underrepresentation of parental education levels among graduate degree recipients, by cohort. Data are from the National Survey of College Graduates (NSF 2013).

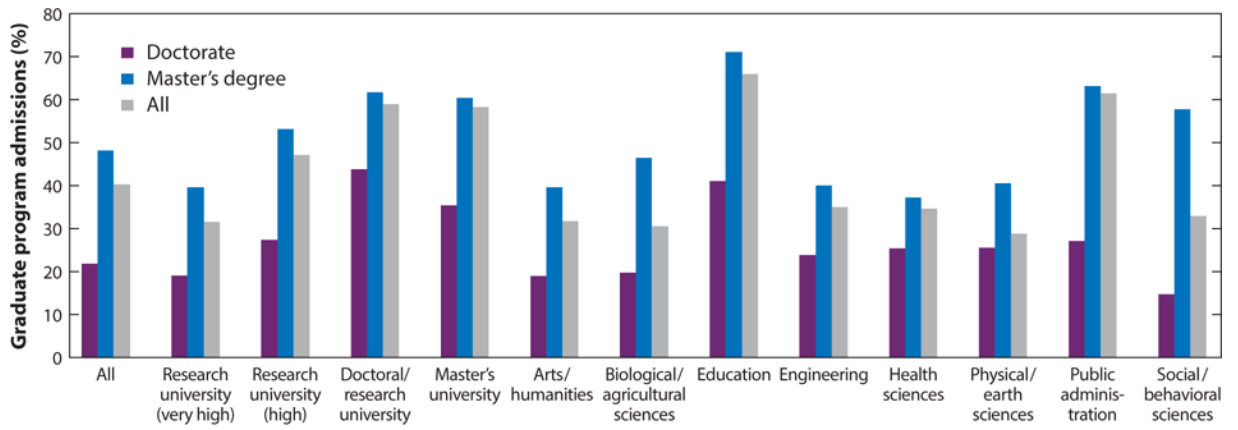


Figure 3. Admission rates in US doctoral, master's, and all graduate programs, by institutional Carnegie classification and field of study. Data are from Council of Graduate Schools, *Graduate Enrollment and Degrees: 2003–2013* (Allum 2014).

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Table 1

Indices of dissimilarity for fields of study by degree type and high school cohort, across gender and race/ethnicity^a

	MA	PhD	Professional degree
Gender: males and females			
Pre-1970	50%	52%	9%
1970s	48%	47%	14%
1980s	42%	45%	9%
1990s	41%	40%	5%
Race: African American and white			
Pre-1970	39%	57%	24%
1970s	34%	55%	17%
1980s	32%	68%	9%
1990s	39%	65%	6%
Race: Hispanic and white			
Pre-1970	41%	53%	–
1970s	32%	48%	20%
1980s	35%	50%	4%
1990s	32%	43%	16%

^aData denote the percentage of those in the first group (e.g., males, African Americans, Hispanics) who would need to change their field of study to equalize distribution across the two groups. Data are from the National Survey of College Graduates (NSF 2013).

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