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by
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ABSTRACT

This work addresses nationally critical and timely policy concerns about the small percentage of Latinas and Latinos who earn doctorates relative to their share of the population, the role of Hispanic Serving Institutions (HSIs) in helping to meet the needs of the Latina and Latino community, and the underrepresentation of Latinas and Latinos in the professoriate. The dissertation consists of three papers in which I analyze the national Survey of Earned Doctorates to examine doctoral education of Latinas and Latinos between 2000 and 2010. In the first paper, I examine the (sub)baccalaureate origins of Latinas and Latinos who earned doctorate degrees in education, humanities, and social sciences. Findings show that the plurality of Latina and Latino doctorates originate from community colleges and public, non-HSI universities. The first paper highlights the importance of supporting community colleges and public, non-HSI universities in preparing Latinas and Latinos to earn doctorate degrees. In the second paper, I seek to better understand the role that HSIs play in the production of Latina and Latino social scientists. I use multinomial logistic estimation to determine that Latinas and Latinos who earned baccalaureate degrees from HSIs were more likely to earn doctorates from less-research-intensive universities. An institutional pathway between HSIs and the nation’s least-research-intensive universities is beneficial for increasing the number of Latinas and Latinos who earn social science doctorate degrees; however, it may be problematic for preparing future faculty members, most of whom are hired out of the nation’s leading research universities. For the third paper, I focus on sources of financial support that can facilitate access to faculty careers. I use multinomial logistic estimation to test for relationships between various sources of funding and Latina and Latino social scientists’ post-graduation plans. My findings show that teaching assistantships are consistently related to Latina and Latino doctoral students’ odds of planning to work as a faculty
member. These findings shed new light on prior work that emphasized the role of research assistantships in socializing graduate students to faculty careers.
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CHAPTER 1: MASS HIGHER EDUCATION AS THE FOUNDATION OF DOCTORAL EDUCATION

Doctoral programs prepare students to be leaders in the 21st century knowledge economy. The United States produces a plurality of the world’s scientific publications, and university-trained and university-employed researchers write or co-author a majority of the nation’s research. However, with each passing year, the U.S. produces smaller proportions of the world’s scientific research, and nations such as Brazil and China produce larger percentages of the world’s scholarship (Zhang, Powell, & Baker, 2015). To ensure U.S. competitiveness, scholars need to examine the ways that different types of colleges and universities facilitate pathways to doctorate degrees and into faculty or research-related jobs. Such a research agenda should also focus on racially and ethnically underrepresented students, such as Latinas and Latinos, who increasingly make up larger percentages of the U.S. population (U.S. Census Bureau, 2012).

Universities have become increasingly important social institutions in a global “schooled society” (Baker, 2014), and it is important that Latinas and Latinos are prepared to take positions within those institutions and bring diversity of ideas and experiences to the research process and take part in the creation of new knowledge (antonio, 2002; Page, 2008; Woodrow Wilson National Fellowship Foundation, 2005). Additionally, when Latinas and Latinos work as faculty members, they can mentor future Latina and Latino students and help them be successful in higher education (Fairlie, Hoffman, & Oreopulos, 2014; Santos & Reigadas, 2002). Moreover, increasing the representation of Latinas and Latinos in academia is an important step toward improving campus racial climates so that other minority faculty members will be more likely to continue working at their colleges and universities (Fries-Britt, Rowan-Kenyon, Perna, Milem, & Howard, 2011).
It is a uniquely American challenge to study the ways that multiple types of colleges and universities contribute to large-scale doctoral production. In many countries, powerful central governments control the makeup of higher education systems and hold strong influence over how many colleges and universities exist, which types of degrees they may offer, and the size or accessibility of doctoral programs. For example, in Germany students are assigned to educational tracks, and students who are assigned to vocational or technical school tracks have limited options for pursuing additional higher education. In some countries such as France and the United Kingdom, national policymakers control the growth of higher education, and their systems of doctoral education are relatively small and highly selective (e.g., Ben-David, 1977; Clark, 1995; Simpson, 1983).

American graduate education was not centrally organized. Congress declined to establish a national university or to decide which universities could award graduate degrees and which colleges would serve as feeder schools for graduate programs. In the United States, the private and public sectors of higher education were relatively unregulated, which allowed individuals, non-profit organizations, and state or local governments to create colleges and universities. Martin Trow (2010) characterized the lack of regulation over U.S. higher education as “academic federalism.” Trow (2007) also coined the term “mass higher education” to describe the unprecedented enrollments that flooded the United States’ conglomeration of colleges and universities after World War II.

Because the United States higher education system is comprised of many types of colleges and universities, various institutional pathways lead to doctorate degrees. For example, after graduating from secondary school, a student can enroll in a highly-selective, research-intensive university and complete baccalaureate and doctoral degrees at the same institution.
Conversely, a student could struggle to graduate from high school, attend a two-year college, transfer to a small private baccalaureate college, earn a master’s degree from a major private research university, then earn a doctorate degree from a public research university. Though they may not be equally common, there are many institutional pathways that can result in doctorate degrees. Understanding the ways that different types of colleges and universities contribute to graduate education may lead to new areas of research and policy recommendations—both will be important for improving opportunities for racially and ethnically underrepresented students to earn doctorate degrees and go on to work in academia.

In general, a system-wide perspective on doctoral production is an overlooked research problem. Without federal planning, the mass system of higher education works really well at producing thousands of doctorates across many fields (e.g., Baker, 2008, 2014; National Science Foundation, 2015). However, the system perspective is especially relevant for Latinas and Latinos in the United States who are underrepresented among the nation’s researchers; yet they are overrepresented in the nation’s least selective colleges and universities, such as community colleges (American Association of Community Colleges, 2016).

**Latina and Latino Underrepresentation in U.S. Education**

Latinas and Latinos have historically been underrepresented throughout the educational pipeline, both relative to their share of the population as well as compared to other ethnic and racial groups. Though Latinas and Latinos were historically underserved by the American educational system, they are now the largest—and fastest growing—racial or ethnic minority group. Latinas and Latinos made up nearly 17% of the U.S. population in 2011, but they earned only 6.5% of research doctorates in 2014 (National Science Foundation, 2015; U.S. Census Bureau, 2012). As the percentage of Latinas and Latinos continues to grow, it will be
increasingly important to understand how they are incorporated into the U.S. system of doctoral education.

Latinas and Latinos also had the lowest high school graduation rates compared to African Americans, American Indians, Asian Americans, and Whites. For every 100 students, fewer Latinas and Latinos graduated from college than other ethnic or racial groups. The inequities throughout the educational system culminated in Latina and Latino underrepresentation in doctoral education, where smaller percentages earned doctorates than American Indians, Whites, and Asian Americans.\(^1\) Similar percentages of Latinas and African American women earned doctorates (0.3\%), but a higher percentage of African American men earned doctorates (0.5\%) than Latinos (0.4\%) (Pérez Huber et al., 2006). Additionally, while the percentage of Latinas who earned doctorates increased in the final decades of the 20\(^{th}\) century, the percentage of Latinos who earned doctorates (0.3\%) stayed relatively similar since the 1970s (Contreras & Gándara, 2006).

**Current Research on Doctoral Education Has Several Limitations**

Several classic works examined American doctoral education and have analyzed its origins, historical development, and capacity for training researchers (e.g., Ben-David, 1977; Berelson, 1960; Bowen & Rudenstine, 1992; Clark, 1995; Geiger, 2004, 2009; Rossiter, 1984, 1998). These studies often used national or aggregate-level data to chart the exponential increase in the number of doctorates that were produced in the United States over the 20\(^{th}\) century, particularly after World War II. Some of the volumes casted American doctoral education as not

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\(^1\) Latinas and Latinos were historically underrepresented among those who earned doctorate degrees. Only .3\% of Latinas and .4\% of Latinos had earned doctorate degrees in 2000. Among American Indians, .4\% of women and .6\% of men earned doctorate degrees. In the Asian American community, 1.4\% of women and 4.4\% of men graduated with doctorate degrees. 0.6\% of White women earned a doctorate, and 1.4\% of White men earned a doctorate (Pérez Huber, Huidor, Malagón, Sánchez, & Solórzano, 2006)
only historically unprecedented, but also as globally unique. Clark (1995) and Ben-David (1977) explained that, unlike many countries around the world, the United States’ system of doctoral education was characterized by a large number of doctorate-granting universities that are widely accessible.

More recent studies of graduate education have used original student or institutional-level data to examine the experiences of individual students or the effects of various practices on doctoral education (e.g., Ehrenberg, Jakubson, Groen, So, & Price, 2007; Ehrenberg, Zuckerman, Groen, & Brucker, 2009; Nettles & Millet, 2006), however there are major limitations to current research. First, much of the quantitative literature on doctoral education does not address issues related to Latinas and Latinos. The studies that have focused on Latinas and Latinos (Solórzano, 1995; Solórzano, Rivas, & Velez, 2005) tend to be dated or to describe only sub-groups of the Latina and Latino population—both of which are challenges for future policy. Second, research on graduate education often conflates fundamentally different types of degree programs (e.g., master’s, juris doctorate, research doctorates), which use various teaching and graduation requirements to prepare students for different career paths (e.g., Ethington & Smart, 1986; Perna, 2004). While it is important to examine Latina and Latino students’ access and success in multiple types of graduate education, it does not make sense to assume that findings regarding master’s-level education programs also apply to doctoral education or that all fields of doctoral education are similar. Finally, much of the literature on doctoral education focuses on elite colleges and universities, but those schools make up a small minority of the colleges and universities in U.S. higher education (Barnes & Randall, 2012; Ruef & Nag, 2015). The defining characteristic of U.S. graduate education is that it is an outgrowth of mass undergraduate
education; focusing on the most selective or most research-intensive universities ignores the thousands of other colleges and universities where Latinas and Latinos are most often found.

Contributions of the Current Study

This dissertation is the start of a research agenda that addresses several limitations of current scholarship by focusing on Latinas and Latinos who graduate from doctoral programs. The analyses in this dissertation will examine the network of undergraduate colleges and universities that created mass then universal access to higher education (Trow, 2007, 2010) and the ways that those colleges and universities contribute to doctoral production. In other words, this study will consider mass higher education as the foundation of our system of graduate education. This dissertation will contribute to the current literature on doctoral education of Latinas and Latinos by (a) examining the (sub)baccalaureate origins of students who earned doctorate degrees; (b) determining whether there are institutional pathways from Hispanic Serving Institutions (HSIs) to doctorate-granting universities; (c) assessing the pathway from doctoral education into academia and postdoctoral research positions. The findings will have implications for educational policy makers who seek to increase the number and percentage of Latinas and Latinos who earn doctorates and are prepared to work in academia.

Traditionally, mass higher education tends to be studied in terms of public and private institutions, but this study will include two additional institutional types—community colleges and HSIs—to better understand the ways that mass higher education provides Latinas and Latinos with institutional pathways to graduate education. Scholars have examined differences in the ways that public and private institutions were chartered and governed, which were reflected in their missions, levels of accessibility, and fields of study. For example, David Labaree (2010) and Roger Geiger (2005) have argued that many public colleges and universities
were established to train workers in practical fields that addressed social needs. In the 19th and 20th centuries, state policymakers founded land-grant colleges that prepared students to work in agricultural and mechanical fields. States also established normal schools that prepared teachers for fast-growing primary and secondary schools. Jencks and Riesman (1968) argued that for historical and budgetary reasons, leaders of public universities focused on providing broad access to higher education while private colleges and universities tended to stay smaller and more selective—in part so they could focus on preparing undergraduate students to pursue graduate degrees. While important, the focus on public versus private baccalaureate universities overlooks the roles of community colleges and HSIs, which are often attended by Latinas and Latinos (Castellanos, Gloria, & Kamimura, 2006).

**Latinas and Latinos are Over-Represented in Two-Year Colleges**

Latinas and Latinos are underserved at many junctions in the U.S. educational pipeline, but they are over-represented in two-year community colleges. In Fall 2014, Latinas and Latinos made up approximately 17% of the U.S. population, yet they represented 22% of the students enrolled in community college credit-bearing programs. Moreover, community colleges enrolled 57% of all Latina and Latino undergraduate students in the United States. This stands in contrast to the fact that four-year colleges and universities enrolled the majority of all U.S. undergraduates, as well as majorities of first-time, first-year students and Asian or Pacific Islander students. Community colleges also enrolled a larger percentage of all undergraduate Latinas and Latinos than of Black students (52%) in undergraduate programs in the United States (American Association of Community Colleges, 2016).

Public two-year colleges have a long history, dating back to the beginning of the 20th century, when presidents of the University of Chicago and Stanford University argued that
outsourcing lower-division education to community colleges would allow research-oriented universities to focus on upper-division and post-baccalaureate education. The early support from university presidents supported the idea that students should be able to begin at open-access two-year colleges and transfer to complete their studies at four-year universities. Many state and local governments established new community colleges throughout the 20th century and particularly after World War II. Several states with large populations of Latinas and Latinos, such as Arizona, California, Florida, Illinois, New York, and Texas have several community colleges that enroll millions of students (Cohen & Brawer, 2008; Dougherty, 2001).

Traditionally, sociological research on two-year colleges has supported the idea that community colleges further stratify American higher education and society. Scholars such as Burton Clark (1960) and Jerome Karabel (1977) have acknowledged that many students—particularly ethnic and racial minority students—never graduate from community colleges or transfer to four-year institutions. David Labaree (1999) has also explained that because community colleges are so widely accessible, they allow the U.S. system of higher education to satisfy public demands for higher education, while preserving highly-selective admissions practices at the most prestigious institutions. In this way, sociologists of education have tended to argue that community colleges present an institutional dead-end and that the schools perform the function of “cooling-out” students from pursuing additional higher education (Clark, 1960).

Newer research on the sociology of education argues that scholars need to focus more on what community colleges do rather than what they do not do (e.g., Kirst & Stevens, 2015; Ruf & Nag, 2015; Schudde & Goldrick-Rab, 2015). For example, Schudde and Goldrick-Rab (2015) suggested that researchers should “highlight the societal benefits of the institutions, rather than focusing on the diversionary effects of community colleges on educational goals, to build
support for greater public investment” (p. 38). Indeed, preliminary evidence suggests that some groups of Latinas and Latinos attended community college prior to earning their doctorate degrees (Solórzano et al., 2005). If community colleges are shown to constitute institutional pathways to doctoral degrees, then the findings will build on work by Schudde and Goldrick-Rab and may inform future policy efforts about where to allocate resources to improve pathways to the doctorate and into research careers.

The Role of Hispanic Serving Institutions (HSIs)

Scholars have also found that Latina and Latino students are more likely to attend community colleges and HSIs, especially when they are women, older, poorer, or the first in their families to attend higher education (Contreras & Gándara, 2006; de los Santos & de los Santos, 2006). Students may choose to attend HSIs because they are broadly accessible and often have welcoming climates for Latina and Latino students. However, HSIs are often under-resourced and under-funded, and HSIs often do not have the financial resources that wealthier and more highly-selective institutions use to support students. Still, preliminary work suggests that HSIs are important points of preparation for U.S. doctoral programs (Contreras & Gándara, 2006; de los Santos, & de los Santos, 2006; Lundy-Wagner, Vultaggio, & Gasman, 2013; Santiago, Taylor, Calderón Galdeano, 2016a, 2016b).

HSIs do not have similar legacies in U.S. higher education as Historically Black Colleges and Universities (HBCUs) or Tribal Colleges and Universities (TCUs), which were founded to serve specific populations of students (Gasman & Conrad, 2013). HSIs were first recognized by the federal government in the Higher Education Act of 1965 as colleges and universities with enrollments of at least 25% Latina and Latino students (Merisotis & McCarthy, 2005). Merisotis and McCarthy note that “unlike HBCUs and TCUs, most HSIs were not founded to serve a
particular population but rather evolved through their geographical proximity to Hispanic populations” (2005, p. 47). Indeed, many colleges and universities are enrolling larger percentages of minority students as the demographics of the country change. As individual institutions diversify their enrollments, larger numbers of colleges and universities meet the threshold for HSI status. Anne-Marie Nuñez, Gloria Crisp, and Diane Elizondo (2016) have proposed a typology of HSIs and argued that HSIs may be better studied by disaggregating between groups of HSIs. However, sociologically speaking, it makes sense to consider HSIs as a single type of institution because the HSI definition is nationally-shared and becomes part of an organization’s identity and influences the ways that HSIs make meaning of themselves, their peers, and their environment.

HSI status becomes a defining characteristic in terms of the way the university is understood and managed by leaders working within the organization. For example, colleges and universities with HSI status maintain a peer network or membership organization known as the Hispanic Association of Colleges and Universities (HACU). HACU facilitates collaboration among HSIs and advocates for federal policies that address the needs of HSIs (Calderón Galdeano, Flores, & Moder, 2012; Merisotis & McCarthy, 2005). Additionally, HSIs are designated as a single group in databases maintained by policymakers, such as the Integrated Postsecondary Data System and the Carnegie Classifications Data File (2012). Finally, HSI status becomes relevant in the ways that colleges and universities position themselves for resources. Since 1995, the federal government has provided competitive grant funding opportunities for HSIs under Title V of the Higher Education Opportunity Act. HSIs must also meet other qualifications (namely, enrolling large percentages of low-income students and having budgets under a specified threshold) to be eligible for the Title V capacity-building grants
However, institutions that are not HSIs cannot apply to the grant program, even if they meet the latter qualifications. Thus, it is important to consider HSIs as an institutional type to draw implications that are relevant for practitioners and policymakers who understand HSI status as significant for operating and funding colleges and universities that serve large percentages of Latinas and Latinos.

**Organization and Contributions of the Dissertation**

This dissertation is the start of a larger research effort to examine the ways that different types of colleges and universities contribute to doctoral education and prepare the nation’s researchers. I begin by examining Latina and Latino doctorate degree earners, to address national policy concerns about the underrepresentation of Latinas and Latinos among the nation’s professors and researchers (e.g., White House Office of the Press Secretary, 2010; Woodrow Wilson National Fellowship Foundation, 2005; U.S. Department of Education and White House Initiative on Educational Excellence for Hispanics, 2011). There are multiple dimensions in the process of preparing doctorate degree earners, including (a) the role of multiple types of undergraduate colleges and universities in provide access to higher education; (b) the presence of institutional pathways from baccalaureate to doctoral institutions; (c) the transition from the doctoral programs into the labor market.

This dissertation is organized as three stand-alone research papers that addresses separate dimensions of the production of Latina and Latino researchers. For each paper, I analyze data from the national Survey of Earned Doctorates, which collects information on graduates of research-oriented doctoral degree programs in the United States. In the first paper (Chapter 2), I seek to better understand the (sub)baccalaureate origins of Latina and Latino doctorate degree earners. I examine the percentages of researchers in education, humanities, and social science
fields who attended community colleges and who earned baccalaureate degrees from public, private, and HSI colleges and universities. Finally, I assess the policy environments of a small selection of baccalaureate universities where large numbers of Latinas and Latinos earned baccalaureate degrees. Examining the policy environments of some of these schools will demonstrate whether the colleges and universities are benefitting from state and federal policies that encourage opportunities for racially and ethnically underrepresented students. I close by discussing opportunities for future research and considering possible policy interventions for increasing the percentage of Latina and Latino doctorate degree earners.

In the second paper (Chapter 3), I focus on the role of HSIs in doctoral production of social scientists. Most HSIs do not offer graduate degrees (Santiago et al., 2016a), which makes these colleges more likely to contribute to the production of Latina and Latino doctorates at the undergraduate level. I analyze the relationship between earning a baccalaureate degree at a HSI and the types of universities where Latinas and Latinos earned social science doctorate degrees. I identify an institutional pathway between earning an undergraduate degree at a HSI and earning a doctorate degree at less-research-intensive-universities. Whereas most research on doctoral education has focused on the nation’s leading research universities (Barnes & Randall, 2012), my findings in Chapter 3 suggest that researchers and policy makers may need to devote more attention and resources to HSIs and less-research-intensive-universities to improve opportunities for training Latina and Latino social scientists.

In the third paper (Chapter 4), I examine the pathway for Latina and Latino social scientists who enter into academia or postdoctoral research positions. After controlling for the effects of attending various types of institutions, I examine relationships between different sources of financial support (e.g., graduate research assistantships and teaching assistantships)
and Latina and Latino social scientists’ post-graduation plans. The third paper challenges previous literature that suggested that students with graduate research assistantships were most likely to take jobs as faculty members; instead, the paper highlights a positive relationship between having teaching assistantships and plans to work in academia or as post-doctoral researchers. The paper extends previous literature by modifying and testing Tinto’s (1993) model of graduate student persistence and showing that one element of the model (financial sources of support) may be leveraged by policymakers and practitioners who want to strengthen the pathway for Latinas and Latinos from doctoral programs into academia.

In Chapter 5, I review the purpose and scope of the dissertation. I also synthesize the findings from the three empirical chapters, and I discuss the implications of those findings for increasing Latina and Latino representation in doctoral education and academia. The final chapter also identifies promising directions for pursuing this research agenda.

Limitations of Findings

This study was designed to focus on assessing the role of various types of institutions in producing Latina and Latino doctorates who are prepared to be producers and consumers of academic research. As such, this study is distinctly different from research that examines students’ background characteristics, collegiate experiences, and outcomes in the context of a single institution. The analyses that follow control for a limited number of student background characteristics, however, this institutional- or system-approach to examining doctoral education omits many variables that are related to educational aspirations and student success.

Additionally, this study does not seek to address self-selection issues. It is outside the scope of the research project to examine why students may choose to attend one type of college or university over another. Similarly, this study does not seek to examine issues related to
individual students’ access, matriculation, or attrition. Many students apply and are not admitted or enroll and do not graduate from the nation’s colleges and universities. Although this study uses individual student data, the papers focus their discussion and implications on the ways that various types of institutions contribute to the preparation of Latina and Latino researchers.
References


CHAPTER 2: UNDERSTANDING THE (SUB)BACCALAUREATE ORIGINS OF LATINA AND LATINO DOCTORATES IN EDUCATION, HUMANITIES, AND SOCIAL SCIENCE FIELDS

Latinas and Latinos in the United States earn more doctoral degrees than ever but are still underrepresented among doctorates in many academic fields, relative to their share of the population. Latinas and Latinos made up nearly 17% of the U.S. population in 2011, but they earned only 6.5% of doctorates in 2012 (National Science Foundation, 2015; U.S. Census Bureau, 2012). Latinas and Latinos who earn doctorates are able to take teaching and research positions at universities where they make up small percentages of the nation’s faculty members (Turner, González, & Wood, 2008). Even when Latinas and Latinos do not enter into academia, doctoral programs train students “for the intellectual-practical professions” and to be leaders in society (Parsons & Platt, 1968, p. 508). Therefore, policymakers acknowledge that we should increase the number of Latinas and Latinos who earn doctorates to improve social equity (e.g., U.S. Department of Education and White House Initiative on Educational Excellence for Hispanics, 2011; Woodrow Wilson National Fellowship Foundation, 2005). To achieve this policy goal, we need to better understand the types of colleges and universities that Latinas and Latinos attend before earning doctoral degrees in order to focus policy efforts and programs at the institutions where they may have the greatest impact.

2 Traditionally, federal agencies used the term “Hispanic” to refer to minorities who self-identify as Mexican-American, Chicana/o, Cuban, or trace their lineage to countries in “Central America, South America, Spain, Portugal, and the islands of Cuba, Puerto Rico, and the Dominican Republic” (Oseguera, Locks, & Vega, 2008). I use “Latina/o” to be consistent with recent federal publications such as the White House’s 2011 initiative: “Winning the Future: Improving Education for the Latino Community.”

3 I use the terms “doctoral education,” “doctoral programs,” “graduate education,” and “graduate school” to refer to the training of research doctorates (i.e., the Ph.D. and Ed.D.). First-professional and other terminal doctoral degree programs (e.g., J.D., D.D.S.) are excluded from this study because they have significantly different admissions standards (relying primarily on the Law School Admissions Test or Dental Admissions Test instead of the Graduate
Latinas and Latinos who earn doctorates may do so in a broad range of fields. The eminent sociologist Talcott Parsons observed that the hard sciences support technological development and are viewed as “handmaidens of economic interests” (Parsons, 1939, p. 458). However, Parsons also acknowledged that technological progress reveals new social problems, which engineers, physicists, and chemists are not trained to study (Parsons, 1946). Because I am interested in examining Latina and Latino doctorates for their potential to be leaders in society, I choose to examine Latinas and Latinos who earned doctorates in education, humanities, and social science fields; graduates in these fields are uniquely prepared to address problems related to social, educational, and economic inequality.\(^4\) I also exclude students from STEM-related fields from the current study because scholars recommend that science, STEM fields should be studied separately from non-STEM fields (e.g., Ehrenberg, Jakubson, Groen, So, & Price, 2007).

The United States has an inequitable educational system that creates a poor pipeline for ethnic and racial minorities to earn doctorate degrees. Although most White teenagers receive high school diplomas, many young Latinas and Latinos do not complete secondary school. Furthermore, Latinas and Latinos are less likely than White students to graduate at each stage of postsecondary education (Saenz & Ponjuan, 2009; Watford, Rivas, Burciaga, & Solórzano, 2006). When Latinas and Latinos attend higher education, they often enroll at less-selective colleges that are underfunded and have lower graduation, persistence, and retention rates (Contreras & Gándara, 2006; Santiago, Taylor, & Calderón Galdeano, 2016a). Yet students are

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\(^4\) Although they may employ different methodologies than those common in social science and educational fields (Elster, 2015), even humanities-related fields, such as history, help us understand the ways that we define and problematize social issues. For example, Leah Gordon’s (2015) intellectual history explains how psychological and survey research defined racism as an individual problem and proposed education as a solution to reducing prejudice. Similarly, Rachel Klein’s (1995) cultural history demonstrates the ways that elites have used art and culture as a way to unify—or conversely stratify—American society.
more likely to earn baccalaureate degrees and pursue doctoral education when they attend highly-selective universities (Ethington & Smart, 1986; Mullen, Goyette, & Soares, 2003; Zhang, 2005).

If most Latinas and Latinos do not attend selective institutions that are more likely to send their alumni to doctoral programs, then it begs the question: what are the (sub)baccalaureate origins of Latinas and Latino doctorate degree earners? Scholars have offered several explanations about where Latinas and Latinos earned baccalaureate degrees before applying to graduate school. First, Solórzano (1995) examined the educational backgrounds of Chicanas and Chicanos who earned social science doctorates in the 1980s and found that they disproportionately earned baccalaureate degrees at small, private teaching colleges.5 Second, researchers suggested that Hispanic Serving Institutions (HSIs) may open the pipeline for Latinas and Latinos to later pursue graduate education, in part because HSIs are accessible and have more welcoming racial campus climates (Contreras & Gándara, 2006; Lundy-Wagner, Vultaggio, & Gasman, 2013).6 Additionally, the number of HSIs “more than doubled” since the early 1990s, suggesting that more Latina and Latino doctorates may have attended and earned baccalaureate degrees from HSIs (Santiago, Taylor, & Calderón Galdeano, 2016a, p. 5). Finally, scholars have identified policies or programs that may affect the Latina and Latino pathway to graduate education. For example, Latina and Latino students who attended universities with undergraduate research experience programs may have had developed social or cultural capital and aspirations to attend graduate school (Posselt & Black, 2012). Additionally, affirmative action or race-conscious admissions programs may have helped Latinas

5 Solórzano (1995) defined Chicanas and Chicanos as a subset of the larger Latina and Latino population, including “persons of Mexican origin living in the United States as either citizens or permanent residents” (p. 29).
6 Hispanic Serving Institutions were designated by the Higher Education Act of 1965 as institutions where at least 25% of the student body identifies as Latina/o (Merisotis & McCarthy, 2005).
and Latinos attend selective institutions that prepare students for graduate education (e.g., Solórzano, & Yosso, 2002; Yosso, Parker, Solórzano, & Lynn, 2004).

Although scholars offer several observations about Latina and Latino doctorates, the literature tends to overlook the defining characteristic of American higher education—its thousands of public, broadly-accessible colleges and universities. In fact, sociologists of education recently called for new research that examines open-access or “broad access colleges,” which enroll four-fifths of all students in American higher education (Scott, 2015a, 2015b). With funding from the Bill and Melinda Gates Foundation, Kirst and Stevens (2015) led a group of scholars in developing an innovative research agenda for studying the roles of community colleges and non-selective universities. However, in their work, Kirst and Stevens did not examine whether broad-access colleges prepare future doctorates.

In this paper, I seek to build on recent sociological studies that conceptualized American undergraduate education as an institutional field (Kirst & Stevens, 2015; Scott, 2015a; Scott, 2015b). The broad-access or institutional field approach is useful for understanding the education origins of Latinas and Latinos—and ways to increase Latina and Latino doctorate earners—because Latinas and Latinos are more likely than White students to attend community colleges and broadly-accessible public colleges and universities, including Hispanic-Serving Institutions (e.g., Contreras & Gándara, 2006; Solórzano, Rivas, & Velez, 2005). More specifically, I address the following research question:

- What types of colleges and universities (e.g., two-year, four-year public, four-year private, or four-year HSI) provided undergraduate education to Latinas and Latinos who earned doctorates in education, humanities, and social science fields between 2000 and 2010?
Moreover, I aim to better understand the extent to which state and federal policies support practices that foster Latina and Latino students’ success in higher education. To do this, I will examine a relatively small group of universities that awarded large numbers of baccalaureate degrees to Latinas and Latinos who later earned doctorates. Building on the first research question, it is important to identify the institutional characteristics (public or private, HSI status) of the universities where many Latinas and Latinos complete their undergraduate training. Then I will examine whether the universities will benefit from state and federal policies that improve opportunities for Latinas and Latinos in years to come. Therefore, I also ask:

- **Which 25 baccalaureate institutions had the largest number of Latina and Latino alumni who earned doctorates between 2000 and 2010, and are the institutions (a) public or private universities; (b) designated as HSIs; (c) receiving federal funds to offer undergraduate research opportunities to their minority students; (d) in states that allow race-conscious admissions?**

Addressing these research questions will improve our understanding of the (sub)baccalaureate origins of Latinas and Latinos who earned doctorates in education, humanities, and social science fields in the 21st century. Findings from these questions will contribute to a larger discussion about ways to increase the number of Latina and Latino doctorates.

In the sections that follow, I review relevant literature on various types of colleges and universities that characterize the (sub)baccalaureate origins of Latina and Latino doctorates. Then I describe the data and methods used in this study. I address my research questions by descriptively analyzing data from the Survey of Earned Doctorates (SED). More specifically, I examine the educational backgrounds of Latinas and Latinos who earned doctorates in education, humanities, and social science fields. For the first research question, I address differences across
academic fields, but for the second research question I pool the sample for all three areas of study.

Unlike Solórzano (1995), I find that the largest percentages of doctorates originated at public, non-HSI universities—instead of private schools. I also find that large percentages of Latina and Latino doctorates in all three academic fields attended community colleges, which builds on previous work by Solórzano and colleagues (2005). When I examine the 25 universities with the most Latina/o alumni who earned doctorates, I find that a majority were public, non-HSI universities. As of 2010, a majority of the public universities were barred by state laws from using affirmative action, and most of the 25 universities do not receive federal funds to provide undergraduate research experiences through the Ronald E. McNair Postbaccalaureate Achievement Programs.

I close by suggesting that the largest baccalaureate producers of the previous decade are not benefitting from state and federal policies that encourage diversity, however Latinas and Latinos are able to use open-access two year colleges and broadly-accessible public universities to chart multiple pathways to the doctorate. The shift between attending small, private colleges in the 1980s and public, non-HSI universities in the 2000s fits a historical pattern in American society, whereby women, racial, ethnic, and religious groups were once largely excluded but over time made their way into mainstream public education (e.g., Moore, 1986). At a time when public colleges and universities seem to be responding to budget cuts and policy changes by becoming less accessible to low-income and minority students (Kelchen & Stedrak, 2016; Umbricht, Fernandez, & Ortagus, 2015), policymakers and researchers should consider the importance of a well-funded, accessible public sector of higher education.
Literature Review

The American system of higher education includes several types of colleges and universities, which emerged in the mid-20th century to accommodate increased demand for higher education. After World War II, the Servicemen’s Readjustment Act (GI bill) encouraged returning soldiers to attend colleges and universities. The 1950s saw a sharp increase in the percentage of 24-year olds who completed high school and were eligible to pursue post-secondary schooling. Then in the 1960s, the baby boom generation began to grow old enough to attend college. Together, these demographic changes resulted in greater percentages of Americans seeking higher education (Baker, 2014; Geiger, 2014).

Generally speaking, private colleges and universities responded to the glut of applicants by increasing selectivity and spending more on instruction per student, but public institutions expanded in size and were more accessible (Geiger, 2011; Jencks & Riesman, 1968). Additionally, several forms of higher education became increasingly prominent in the United States. For example, from the late 1960s to early 1970s, new community colleges “were opened at a rate exceeding one per week” (Geiger, 2011, p. 60). Additionally, many public normal schools or teacher’s colleges became regional universities and started graduate programs. Thus, higher education in mid-century America was characterized by two trends: private and high-quality institutions moved toward selective admissions, while the public sector experienced tremendous growth, both in the number of institutions and the size of their enrollments. The growth of the public sector was said to have resulted first in mass and then universal higher education (Trow, 2000). Early on, mass public higher education was seen as creating new opportunities for students to earn both baccalaureate and doctoral degrees (e.g. Berelson, 1960).
However, recent studies that examined racial and ethnic minority students have characterized non-selective colleges as stratifying American higher education (e.g., Carter, 1999).

I use the rest of this section to review relevant literature on Latina and Latino students and the various types of (sub)baccalaureate institutions they may attend before applying to graduate school. In particular, I focus on the public institutions and broadly-accessible colleges that are often understudied—especially when it comes to understanding who earns graduate degrees in non-STEM fields. This literature on mass higher education sets up the theoretical framework (e.g., Kirst & Stevens, 2015; Scott, 2015a; 2015b) and informs my analyses.

**Community Colleges Are Important Points of Origin for Minority Doctorates**

Multiple empirical studies have found that students who attend selective or higher-quality four-year universities are more likely to go to graduate schools (e.g., Ethington & Smart, 1986; Mullen, Goyette, & Soares, 2003; Zhang, 2005). However, scholars have also tested whether students who attended other types of colleges and universities were less likely to aspire to attend graduate school (e.g., Carter, 1999; Pascarella, Wolniak, Pierson, & Flowers, 2004). For example, Carter (1999) argued that “the structural elements of community colleges seem to ‘cool out’ students from pursuing higher degree goals” (p. 37; referring to Clark, 1960). Carter’s findings support a broader narrative that broadly-accessible community colleges offer poor and minority students access to lower-quality institutions and divert them away from attending higher-quality colleges and universities (e.g., Karabel, 1972; Labaree, 2012). However, even if community colleges dampen students’ degree aspirations, non-peer reviewed briefs suggest that significant percentages of minority doctorates previously attended community colleges (e.g., Solórzano et al., 2005; Tsapogas, 2004). Therefore, it is important to move beyond the
assumption that community colleges “cool out” students from pursuing graduate education and instead examine the extent to which community colleges contribute to doctoral production.

Solórzano and colleagues (2005) examined the educational backgrounds of Mexican-Americans (Chicanas and Chicanos) who completed graduate school in the 1990s, and they concluded that Mexican-American doctorates were more likely to have attended community college than African American or White students. Among Mexican-Americans who earned doctorates and previously attended community colleges, 40% earned doctoral degrees in education fields, followed by 24% in social sciences, and 11% in humanities (Solórzano et al., 2005). Researchers who studied science and engineering fields found that in 1999, approximately 10% of Latina and Latinos who earned doctorates previously attended community colleges (Tsapogas, 2004; see also de los Santos & de los Santos, 2006).

The studies outlined in this subsection suggest that even though community colleges cannot award graduate degrees, they contribute to the production of Latina and Latino doctorates. To be sure, many more Latinas and Latinos enroll in community college and do not graduate or pursue doctoral studies, leading scholars and policymakers to advocate for strengthening the pipeline from two-year colleges to post-baccalaureate studies (e.g., de los Santos & de los Santos, 2006; Roksa, Grodsky, & Hom, 2010; Santiago, Andrade, & Brown, 2004). Still, the fact remains that scholars and policymakers see community colleges as a viable opportunity for increasing the number of Latinas and Latinos who earn doctoral degrees (de los Santos & de los Santos, 2006).

The literature provides an important baseline, but new research is needed for two reasons. First, Latinas and Latinos are one of the fastest growing populations, and the demographics of the country and its higher education system continue to change. Second, Solórzano, Rivas, and
Velez (2005) focused on Mexican-Americans, and their results were not meant to be representative of the broader Latina and Latino population. However, more recent studies (e.g., Oseguera, Locks, & Vega, 2008) and policy discussions (e.g. U.S. Department of Education and White House Initiative on Educational Excellence for Hispanics, 2011; Woodrow Wilson National Fellowship Foundation, 2005) do not tend to consider Chicanas and Chicanos as a separate subgroup. The findings in this study will help provide a more recent and thorough understanding about the extent that community colleges contribute to Latina and Latino doctoral production.

**Baccalaureate Origins**

When students begin at community colleges—as many Latinas and Latinos do—they must transfer to four-year institutions prior to enrolling in doctoral programs. Literature suggests that public universities are more likely than private universities to accept transfer students from community colleges (e.g., Cheslock, 2005). Cheslock (2005) used ordinary least squares estimation, with institution fixed effects, to find that the share of transfer students who enrolled at public universities grew between 1985 and 1996. His results “at least partially reflect a greater commitment by public institutions to provide opportunities for transfer students to enroll” (Cheslock, 2005, p. 273). Though Cheslock’s study provides information about transfer students generally, he did not reach conclusions about Latinas and Latinos. Much of the literature on the undergraduate origins of Latina and Latino doctorates does not highlight the role of public, non-HSI universities, but Cheslock’s study suggests that public institutions may play a larger role than has generally been acknowledged.
In contrast to a focus on the public sector, Solórzano (1995), who examined data from the 1980s, found Mexican Americans (Chicanas and Chicanos) who earned doctorates in social sciences disproportionately earned baccalaureate degrees from small, private four-year colleges. Historically, that may be because private institutions saw their role as preparing students for graduate study (e.g., Jencks & Reisman, 1968). Solórzano (1995) also concluded that a significant number of Mexican-American social scientists originated at HSIs. Since Solórzano’s study, the number of HSIs in the United States has more than doubled, and the number of Latinas and Latinos enrolled at HSIs has more than tripled (Santiago, Taylor, Calderón Galdeano, 2016a). Many HSIs are relatively affordable, have welcoming campus racial climates, and are broadly-accessible for Latinas and Latinos, thus, scholars suggest that HSIs may offer a viable path to graduate education (Lundy-Wagner, Vultaggio, & Gasman, 2013; Merisotis & McCarthy, 2005).

However, many HSIs have low graduation rates, and relatively few HSIs (2%) offer doctoral programs (Contreras & Gándara, 2006; Santiago et al., 2016a). Although HSIs may be either public or private, they are often discussed as a group, based on their common identity as minority serving institutions. The HSI identity is salient because it provides a group of peer institutions and makes universities eligible to receive federal grant money to develop their faculties, academic programs, and student support services (e.g., Santiago et al., 2016a).

**Programs and Practices for Cultivating Diversity in the Graduate School Pipeline**

In addition to understanding the baccalaureate institutional origins of Latina and Latino doctorates, it is important to understand the types of policy environments that institutions face. Examining the institutional environment adds nuance to the first research question, which considers institutional characteristics in isolation from state or federal policies. However,
organizations—and their activities—are fundamentally shaped in response to their environments (Garces & Cogburn, 2015; Miles, Snow, & Pfeffer, 1974). I will identify universities that were important baccalaureate producers in the last decade, and I will examine their current policy environment, which may influence Latina and Latino representation in years to come.

Undergraduate research experiences, such as the federally-funded Ronald E. McNair Postbaccalaureate Achievement Programs, help students acculturate to research university norms and aspire to enroll in graduate education (Eagan et al., 2013; Posselt & Black, 2012). In their case study, Posselt and Black (2012) used interview and observation data to examine how a McNair undergraduate research program helped Latinas and Latinos develop researcher identities and aspirations for graduate study. Therefore, in addition to considering whether universities are public or private and HSIs, I also consider whether the universities are receiving federal McNair program allocations that may help them produce large numbers of Latina and Latino baccalaureates who can go on to earn doctorates. McNair programs offer one way of questioning whether federal resources are aligned with the universities that help the largest numbers of Latinas and Latinos earn doctorates in several fields of study.

Similarly, I consider whether public universities with large numbers of alumni who earned doctorates in the 2000s are now constrained from considering ethnicity or race when admitting undergraduate students. Scholars have argued that affirmative action helps minority students attend the most selective institutions in the country, which, in turn, are more likely to send their alumni to graduate school (e.g., Bowen & Bok, 1998). In states that banned affirmative action, Latina and Latino undergraduate enrollments declined at highly selective public universities (e.g., Hinrichs, 2012; Tienda, Leicht, Sullivan, Maltese, & Loyd, 2003). However, only about 500 of the nearly 5,000 colleges and universities in the United States were
highly selective in the 2013-2014 academic year (Santiago et al., 2016b). Thus, changes in affirmative action policies shift where some Latina and Latino students enroll—from highly selective publics to less-selective publics or to private universities—even if the bans do not significantly dampen overall enrollment rates (Arcidiacono, 2005; Hinrichs, 2012; Trow, 1999). Looking to the future, it is important to know which institutions were colleges of origin for large numbers of Latina and Latino doctorates, so we can later consider whether changes in affirmative action policies were likely to shift enrollments toward or away from those institutions.

**Theoretical Framework**

I draw upon the broad-access or institutional field approach that was proposed by Kirst and Stevens (2015) and Scott (2015a, 2015b) to inform my analyses and findings. The institutional field approach is useful for considering the ways that multiple types of colleges and universities—particularly non-selective schools—contribute to graduate education. First, the institutional field approach “reminds us to take account of the full range of educational organizations” (Scott, 2015a, p. 19) including broadly accessible community colleges, public universities, and HSIs. Higher education and sociological literature often focuses on highly-selective, well-resourced institutions, but those colleges serve scarcely 15 percent of undergraduates. The Carnegie Foundation also traditionally focused its efforts on classifying highly-selective and research oriented universities, even though they make up a small percentage of all colleges and universities in the U.S. and enroll relatively small proportions of undergraduate students (Ruef & Nag, 2015). Conversely, open-access or “broad access colleges” enroll four-fifths of all students in U.S. higher education (Scott, 2015a, 2015b). As demonstrated in the literature review, the broad-access or institutional field approach is a good fit
for understanding the baccalaureate origins of Latina and Latino doctorates because they are over-represented in community colleges and less-selective universities, relative to highly-selective institutions (Santiago et al., 2016b).

Second, this sociological approach justifies grouping colleges and universities into several distinct types. It would be impractical to try to analyze the entire higher education system as a conglomeration of unique colleges and universities. Following the institutional field approach, I group colleges and universities into similar types (or “populations”) that adhere to similar “institutional logics.” In other words, I classify colleges and universities into several types that have similar identities (e.g., community colleges, four-year HSIs), similar missions (i.e., seek legitimacy in similar ways), and inhabit a similar domain of the institutional field (Miles, Snow, & Pfeffer, 1974).7

Additionally, the theoretical approach suggests that colleges and universities are “surrounded by and embedded in complex networks” that are shaped, in part, by state regulatory and federal funding environments (Scott, 2015b, p. 71). This final point suggests that it is important to consider state and federal policies, such as affirmative action bans and McNair programs, because they may impact university protocol in terms of admitting students or encouraging them to pursue graduate studies. Under this theoretical framework, I do not consider whether the policies affected baccalaureate origins in the past. Instead, I consider these policies as elements of the organizational environment, which may affect whether universities continue to educate large numbers of future Latina and Latino doctorates.

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7 Even though community colleges and research universities are part of the same institutional field, each type of organization “selects a portion of the total environment as its particular arena of activity (i.e., its domain) and chooses a basic strategy for managing the domain” (Miles et al., 1974, p. 244). It is important to recognize that community colleges can contribute to doctoral production at the sub-baccalaureate level (i.e., they dominate the sub-baccalaureate domain) even if they do not award baccalaureate or post-baccalaureate degrees.
Research Method

Data

I analyze SED data from the National Science Foundation to examine the different types of colleges and universities that contributed to Latina and Latino doctoral production in education, humanities, and social science fields. Graduate schools ask all students who graduate from research-oriented doctoral programs (i.e., excluding medical- or practitioner-based programs) to complete the SED when they file for commencement. If students do not complete SED through their local graduate schools, the National Opinion Research Center will use university graduation lists and contact new doctorates multiple times using phone calls and mailings to collect at least basic demographic information about each person who earns a research doctorate in the United States, including Puerto Rico, which has a similar educational system as the rest of the country, including a mix of community colleges and public and private universities with varying levels of selectivity (Carnegie Foundation for the Advancement of Teaching, 2012; National Opinion Research Center, 2012).

Although SED is cross-sectional, since 1957 it has been the most comprehensive way to collect data on doctoral students. Many longitudinal surveys that follows samples of age cohorts for a period of time and end after a few waves of data collection. SED includes doctoral students whenever they graduate so it captures students who do not earn degrees until later in life—after they would be too old to participate in a typical longitudinal survey. Additionally, SED is ideal because it is a census and includes all minority doctoral degree earners in its sampling frame. In other words, SED does not rely on over-sampling underrepresented students and then re-weighting the data (National Opinion Research Center, 2012).

8 See Appendix A for a complete listing of fields included in the study.
This study will focus on the colleges and universities that educated Latinas and Latinos who were U.S. citizens or permanent residents (i.e., excluding international students) and earned doctorates between 2000 and 2010. I did not include SED data that were collected in more recent years because in 2011 “fifty-nine additional Doctor of Education degree programs were dropped from the SED after NSF determined that the degree programs were more professionally oriented rather than research oriented doctorate degrees” (National Opinion Research Center, 2012, p. 9), and the change in SED’s sampling frame would lead to biased comparisons with earlier years.

I supplement SED with contextual data from the Carnegie Classifications Data File that was produced by the Carnegie Foundation for the Advancement of Teaching (2012). When I merge the Carnegie data with SED, I am able to identify institutions as HSIs, list their locations, and calculate their student enrollments. Finally, I retrieved a list of the 151 colleges and universities with federally-sponsored undergraduate research opportunities from the McNair Scholars Program (n.d.) website and a list of all states that have banned race-conscious college and university admissions from the National Conference of State Legislatures (2014) website.

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9 I chose to exclude international students from this study because the higher education systems in their home countries would not be comparable with the institutional field approach to studying U.S. higher education. More specifically, the U.S. has a unique typology of open-access community colleges, HSIs, and public and private institutions that create multiple pathways to the doctorate. Latina/o students who earn baccalaureate degrees in their home countries would not have the opportunity to follow comparable pathways to the doctorate as students who complete all their schooling in the U.S. Additionally, policymakers have expressed concern that international students are not a substitute for creating greater racial equity in the U.S. and diversifying graduate education. For example, the Woodrow Wilson Foundation lamented that “in 2003, nearly five times as many citizens of other nations (some 14,300) earned U.S. doctorates as did U.S. citizens who are African American and Hispanic (roughly 3,000)” (Woodrow Wilson National Fellowship Foundation, 2005, p. 8).
Variables

I used a student-level SED variable, *Attended Community College* (1 = attended a two-year college; 0 = did not attend a two-year college) as a proxy for measuring the extent that two-year colleges contribute to educating Latinas and Latinos before they earn doctorates. Using the 2010 Carnegie data, I generated a categorical variable, *Baccalaureate Institution* and group baccalaureate and into three mutually-exclusive types (1 = HSI; 2 = public-non-HSI; 3 = private-non-HSI). 10 I removed for-profit colleges and universities because there are very few of them, and they educate small numbers of students in the dataset. 11

After preparing the data for the first research question, I used the Stata statistical package to calculate percentages to determine what proportion of Latina/o doctorates in education, humanities, and social sciences were educated by each type of college or university at the sub-baccalaureate, baccalaureate, and doctoral levels. SED did not contain a sample of people who earned doctorates; instead, it contained population-level data. Therefore, my analytic strategy did not rely on techniques for analyzing survey data (e.g., using sampling weights or calculating sampling design effects). Since SED provided population-level data, this study was not designed to make inferences that are generalizable to a larger population. Instead, the percentages I calculated were interpreted as unbiased estimates of the higher education system. 12

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10 This is a conservative measure of the role of non-HSI institutions, because it pulls from the public-non-HSI and private-non-HSI categories for all years during the period of study. The number of HSIs has been steadily increasing, and it is likely that many people earned baccalaureate degrees years prior to the period of study (2000-2010). However, policy discussions often focus on the future of HSIs, so I do not want to underestimate the role of HSIs in Latina and Latino doctorate production (e.g. Santiago et al., 2016a).

11 Among Latina/os who earned doctorates between 2000 and 2010, for-profit institutions awarded baccalaureate degrees to 11 students who later earned doctorates in education fields, five students who later earned doctorates in social science fields, and one student who later earned a doctorate in a humanities field.

12 However, I am familiar with the fact that some social scientists argue that even population-level data are drawn from a hypothetical super-population or a larger statistical distribution.
I used the merged Carnegie data to address the second research question. More specifically, I generated string variables (Baccalaureate Institution Name and Baccalaureate Institution Location) to identify the 25 universities that awarded the largest number of baccalaureate degrees to Latina and Latino students who went on to earn doctorate degrees in education, humanities, and social sciences between 2000 and 2010. I created a purposive sample of the 25 baccalaureate institutions that had the largest number of graduates who later earned doctorates in any of the three fields (education, humanities, social sciences). This may seem like selecting observations (baccalaureate universities) on the dependent variable (number of alumni who later earned doctorates), however my purpose is not to draw a representative sample that I can analyze in place of the larger population of baccalaureate schools. Instead, this analysis examines the characteristics and environments that define a small, but important group of universities that help produce Latina and Latino doctorates. Understanding these characteristics allows me to understand the policy environment and institutional field that shapes Latina and Latino doctoral production.

After selecting the 25 baccalaureate universities with the most Latina and Latino alumni who earned doctorates in education, humanities, and social sciences, between 2000 and 2010, I use SED data to determine whether the baccalaureate universities are public or private and whether they were granted HSI status according to the 2010 Carnegie Classifications. I also use the contextual data from the McNair Program website to identify whether each university had a federally-funded summer research program available for qualifying minority undergraduate students. Then, I compare the university locations with the information from the National Conference of State Legislatures website to determine whether the baccalaureate universities are located in states that allow race-conscious admissions. Finally, I use the Carnegie data to
determine the overall undergraduate enrollment as of 2010 (I save this as a continuous variable called *Baccalaureate Institution Enrollment*). I calculate a ratio based on the number of alumni who earned doctorates between 2000 and 2010 divided by the 2010 full-time undergraduate student enrollment. I multiply the ratio by 1,000 to represent the number of Latina and Latino doctorates produced for every 1,000 undergraduate full-time students enrolled in 2010, and I name the derived values, *Productivity Ratio*.\(^{13}\)

**Findings**

**The (Sub)Baccalaureate Origins of Latina and Latino Doctorates**

First, I present findings regarding the types of colleges and universities that provided undergraduate education to Latina and Latino doctorates in education, humanities, and social science fields. I first address sub-baccalaureate origins (i.e., whether doctoral degree earners attended community colleges). Then I present findings for the types of universities that awarded baccalaureate degrees to students who earned doctorates in the 2000s.

Two-year colleges educated 32.24% of Latina and Latino doctorates in education fields. Additionally, community colleges helped produce 21.62% of the doctorates earned in humanities fields. Among Latina and Latino social scientists, 21.45% attended community colleges. See Table 1.

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\(^{13}\) This is an adaptation of a formula used by Solórzano (1995) to create an annual “institutional productivity index.”
At the baccalaureate level, non-HSI public universities awarded more than 40%—the plurality—of baccalaureate degrees in all three fields of study. Non-HSI public universities awarded baccalaureate degrees to 45.32% of the Latinas and Latinos who later earned doctorates in education fields. They were also colleges of origin for 42.18% of Latina and Latino doctorates in humanities. The public, non-HSI four-year institutions also graduated 43.52% of the Latinas and Latinos who became social scientists. Non-HSI private universities had a slightly larger role in preparing humanities doctorates (35.55%) than social science doctorates (30.01%), and a smaller role in preparing future doctorates in education fields (18.95%). Based on 2010 HSI status, public and private HSIs awarded baccalaureate degrees to 35.73% of Latinas and Latinos who earned doctorates in education between 2000 and 2010. They awarded smaller percentages of baccalaureate degrees to humanities doctorates (22.27%) and doctorates in social science fields (26.47%). See Table 2.
Table 2

*Baccalaureate Origins of Latinas and Latinos Who Earned Doctorates, 2000-2010*

<table>
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<th>Education</th>
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<th>Social Sciences</th>
<th>All Fields</th>
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<td>1,414</td>
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<td>%</td>
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<td>42.18</td>
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<td>739</td>
<td>975</td>
</tr>
<tr>
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<td></td>
<td>%</td>
<td>0.09</td>
<td>0.09</td>
<td>0.08</td>
</tr>
<tr>
<td>Total</td>
<td>N</td>
<td>3,242</td>
<td>2,290</td>
<td>3,519</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**Baccalaureate Institutions with Large Numbers of Alumni-Doctorates: Past and Future**

With regard to the second research question, Table 3 shows the 25 universities that awarded the largest numbers of baccalaureate degrees to Latinas and Latinos who earned doctorates between 2000 and 2010.\(^{14}\) Together, these 25 universities accounted approximately 36% of doctorates earned by Latinas and Latinos in all three fields during the period of study. I listed the universities according to their number of baccalaureate alumni who went on to earn research doctorates in education, humanities, and social sciences; however, to add an additional level of detail, I also report the productivity ratios for each of the 25 universities.

Most of the universities with the largest numbers of alumni-doctorates were classified as public institutions. In fact, the 13 universities that awarded the most baccalaureate degrees to future Latina and Latino doctorates were all public institutions. Three of the 25 universities were

---

\(^{14}\) Note that unlike the first research question, I pooled the data for all three fields of study because the second research question focuses on identifying universities and the policies that affect those institutions, which awarded the largest numbers of doctoral degrees, regardless of fields. In other words, I had little reason to think that institutions’ policy environments would vary based on whether a university awarded more doctorates in educational fields as opposed to social science fields.
private universities (University of Miami, Harvard University, and Stanford University). As of 2010, nine of the public universities on the list were also HSIs and were eligible to apply for federal grants available to HSIs. It is worth noting that among the sample of 25 universities, several of the most productive are public universities and HSIs (University of Puerto Rico, Rio Piedras Campus; University of Puerto Rico, Mayaguez; Texas A & M University, Kingsville). Two non-HSI private universities (Stanford and Harvard) have relatively high productivity ratios. There is also a significant range in productivity ratios among non-HSI public universities, between Arizona State University (1.46) and University of California, Berkeley (8.59). I organized these results in Table 3.

I find that nine out of the 25 baccalaureate universities receive federal monies to offer minority students undergraduate research experiences (i.e. McNair programs). When I considered an important aspect of the state legal environments, I found that 14 of the 22 public baccalaureate institutions were located in states that no longer allow public universities to consider race or ethnicity in university admissions. See Table 3 for more information.

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Note that, unlike my analyses for the first research question, I am no longer discussing mutually-exclusive categories or designations.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Institution Name</th>
<th>Location</th>
<th>HSI?</th>
<th>Public School?</th>
<th>Number of Baccalaureate Alumni Who Earned Doctorates</th>
<th>Productivity Ratio (per 1,000)</th>
<th>Had McNair Program?</th>
<th>Public School in State with Affirmative Action Ban?</th>
</tr>
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<tr>
<td>1</td>
<td>University of Puerto Rico, Rio Piedras Campus</td>
<td>Rio Piedras, PR</td>
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<td>598</td>
<td>42.76</td>
<td>✓</td>
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<td>✓</td>
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<td>8.59</td>
<td>✓</td>
<td>✓</td>
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<td>Los Angeles, CA</td>
<td>✓</td>
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<td>213</td>
<td>8.17</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>The University of Texas at Austin</td>
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<td>✓</td>
<td>175</td>
<td>4.82</td>
<td>✓</td>
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<tr>
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<td>Florida International University</td>
<td>Miami, FL</td>
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<td>149</td>
<td>6.32</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6</td>
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<td>Mayaguez, PR</td>
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<td>✓</td>
<td>131</td>
<td>10.75</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
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<td>The University of Texas at El Paso</td>
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<td>✓</td>
<td>107</td>
<td>8.01</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
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<td>Gainesville, FL</td>
<td>✓</td>
<td>97</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>9</td>
<td>The University of Texas-Pan American</td>
<td>Edinburg, TX</td>
<td>✓</td>
<td>✓</td>
<td>94</td>
<td>7.14</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>10</td>
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<td>Albuquerque, NM</td>
<td>✓</td>
<td>✓</td>
<td>88</td>
<td>4.94</td>
<td>✓</td>
<td>✓</td>
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<td></td>
<td>3.93</td>
<td>✓</td>
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<tr>
<td>12</td>
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<td></td>
<td>4.01</td>
<td>✓</td>
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<tr>
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<td>85</td>
<td></td>
<td>3.75</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>14</td>
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<td>Coral Gables, FL</td>
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<td>84</td>
<td></td>
<td>8.61</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>15</td>
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<td>College Station, TX</td>
<td>✓</td>
<td>82</td>
<td>2.24</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
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<td>81</td>
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<td>5.41</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>17</td>
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<td>Cambridge, MA</td>
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<td>79</td>
<td></td>
<td>9.59</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
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<td>✓</td>
<td>77</td>
<td>5.81</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
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<td>✓</td>
<td>72</td>
<td>2.99</td>
<td>✓</td>
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</tr>
<tr>
<td>20</td>
<td>Arizona State University</td>
<td>Tempe, AZ</td>
<td>✓</td>
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<td></td>
<td>1.46</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
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<td></td>
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</tr>
<tr>
<td>22</td>
<td>Stanford University</td>
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<td>67</td>
<td></td>
<td>10.19</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>23</td>
<td>California State University, Long Beach</td>
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<td>✓</td>
<td>61</td>
<td>2.38</td>
<td>✓</td>
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</tr>
<tr>
<td>24</td>
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<td>✓</td>
<td>57</td>
<td></td>
<td>2.36</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>25</td>
<td>Texas A &amp; M University, Kingsville</td>
<td>Kingsville, TX</td>
<td>✓</td>
<td>✓</td>
<td>55</td>
<td>10.67</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Discussion and Conclusion

Prior research found that Latina and Latino doctorates disproportionately earned baccalaureate degrees from private colleges (Solórzano, 1995). Other scholars have highlighted the role of HSIs as colleges of origin (Contreras & Gándara, 2006; Lundy-Wagner et al., 2013; Santiago, et al., 2016a). Although both of these institutional types are important, my findings suggest that public, non-HSI universities awarded the largest percentages of baccalaureate degrees to Latinas and Latinos who went on to earn doctorates in education, humanities, and social science fields. It is important that Latinas and Latinos earn doctorates in each of these fields of study, because it has long been recognized that these fields prepare students to address social issues and to be leaders in society (Parsons, 1939, 1946; Parsons & Platt, 1968; Woodrow Wilson National Fellowship Foundation, 2005).

I also found that open-access community colleges play an important role in Latina/o doctoral production. Solórzano and colleagues (2005) examined a subset of the larger Latina and Latino population, but their calculations of students who attended community colleges did not reflect the percent of all doctorates in a given field. For example, Solórzano, Rivas, and Velez found that 40% of all Chicana and Chicano doctorates who attended community colleges earned their doctorates in education fields. My findings suggest that community colleges helped produce nearly one third of Latina and Latinos doctorates in education fields. I also found that community colleges educated more than one-fifth of Latina and Latino doctorates in humanities and social science fields. By comparison, Solórzano et al (2005) found that only 11% of “community college doctorates” earned graduate degrees in humanities fields (and 24% in social sciences fields).
Looking to the future, I examined whether the 25 baccalaureate universities with large numbers of alumni-doctorates are (a) banned by state law from considering ethnicity or race in undergraduate admissions; (b) receiving federal funds to offer structured undergraduate research experience programs to minority students (e.g., McNair programs); eligible to receive federal grants made available to HSIs. These programs have been shown to increase minority students’ opportunities and inclinations for attending graduate school (e.g., Bowen & Bok, 1998; Posselt & Black, 2012). To be sure, universities may seek to increase minority enrollments through other means, or they may offer their own undergraduate research programs to encourage minority students to pursue graduate education. Yet, my descriptive findings suggest that state and federal policies are not aligned with the universities that produced many of the Latina and Latino doctorates in the last decade. I found that over 60% of the public universities in that list are no longer allowed to use race-conscious admissions, and almost two-thirds of the 25 baccalaureate universities I examined do not have McNair programs.

The American educational system is stratified and inequitable at each level of schooling, which has long-term consequences for the number of Latinas and Latinos who earn doctorates. In this paper, I demonstrated that Latinas and Latinos use different types of institutions of higher education to create pathways to the doctorate across several fields of study. Prior literature focused on the role of private universities or HSIs, but I draw attention to the ways that public two-year colleges and public non-HSI four-year schools create a porous system with multiple points of access or zones of opportunity for minority students to pursue higher education and eventually earn doctorates.
This study highlights the importance of maintaining an accessible higher education sector. As public funding for higher education becomes more scare, colleges and universities are subjected to new funding formulas and accountability measures. However, policies that were meant to increase accountability may actually be making public institutions less likely to admit students who have lower test scores, or come from low-income or minority backgrounds (Kelchen & Stedrak, 2016; Umbricht, Fernandez, & Ortagus, 2015). Additionally, the two public universities in Puerto Rico are in danger of losing significant funding due to the debt crisis, which could severely hamper their ability to operate (Morris, 2015). Maintaining public institutions is not just important for undergraduate education—it also opens the pipeline to graduate education.

Practitioners, policymakers, and scholars who are interested in increasing Latina/o representation in doctoral education, may also consider the fact that the community college sector is an important part of doctoral production. Often, the literature tends to reinforce the idea that community colleges divert students from earning baccalaureate and other post-secondary degrees (Carter, 1999; Clark, 1960; Karabel, 1972). Although proportionately small numbers of Latina and Latino students leave community college and earn doctoral degrees, those small percentages of community college students become significant proportions of Latina and Latino doctorates. Thus, community colleges play a critical role when we consider the magnitude of Latina and Latino under-representation among the ranks of those who earn graduate degrees.

The snapshot of 25 universities with large numbers of alumni-doctorates does not suggest that the institutions did not benefit from affirmative action policies or McNair programs in the past. Rather, the findings imply that we need renewed attention among policymakers, researchers, and practitioners about whether the institutions will continue to be colleges of origin
for future Latina and Latino doctorate degree earners. When policymakers and scholars think about the pipeline to the doctorate, they should continue to consider whether McNair programs are available at the institutions where Latina and Latino doctorates are most likely to originate. Additionally, prior research suggests that after states ban affirmative action, minority enrollments will “cascade down” to less-selective universities or shift over to private universities (e.g., Hinrichs, 2012; Kurlaender & Grodsky, 2013). Thus, the broad-access sector may become even more important for preparing Latina and Latino doctorates as new cohorts of students move from high school into undergraduate and, ultimately, graduate education in an era with fewer states allowing affirmative action.

This paper applied the institutional field approach (Scott, 2015a, 2015b; see more generally, Kirst & Stevens, 2015) to examine the baccalaureate origins of Latinas and Latinos who earned doctorates. The institutional field approach is an ideal framework for examining the multiple types of institutions and multi-faceted environments that define American higher education. Traditional scholarship was developed around traditional students, but racial and ethnic minority students often follow non-traditional pathways. It is therefore necessary to “take account of the full range of educational organizations” that may facilitate Latina and Latino student success (Scott, 2015, p. 19).

Additional analyses of the institutional field approach may consider demographic changes that encourage different types of baccalaureate universities to contribute in similar ways to Latina/o doctoral attainment. It is beyond the scope of this paper, to address the variation in productivity ratios, but suffice it to say, enrollment, demographic, and historical factors likely affect the productivity of each university. For example, the productivity ratio was calculated
using the total number of undergraduates following the work of Solórzano (1995), but that does not account for the percentage of undergraduate students who identified as Latinas and Latinos.

Solórzano (1995) analyzed data from the 1980s and found that private colleges were the most common baccalaureate origins for Mexican-American social scientists. However, I used SED data from the 2000s to find that the largest percentages of Latina and Latino doctorates in education, humanities, and social science fields earned their baccalaureate degrees from public universities. One may wonder what would explain such a significant shift from one institutional type to another. Although my findings are only descriptive, further analysis may show that the shift from private institutions in the 1980s to public institutions in the 2000s fits a pattern that has been observed with other groups that were historically excluded. For example, Historically Black Colleges and Universities (HBCUs) were once the best hope for African American students to pursue higher education. Although the higher education system is still stratified, a recent study shows that predominantly white institutions produce larger proportions of doctorates than HBCUs (Sibulkin & Butler, 2011). Similar patterns hold true for women who historically gained access to higher education through women’s colleges but now outnumber men in many parts of the higher education system. Religiously excluded groups, such as Catholics and Jews, also established their own schools until they successfully made their way into mainstream systems of public education (e.g., Moore, 1986). At the turn of this century, we witnessed a shift in the types of universities that open the Latina and Latino pathway to the doctorate and further research should be conducted to reflect this change.
References


Merisotis, J. P. & McCarthy, K. (2005). Retention and Student Success at Minority-


https://www.whitehouse.gov/sites/default/files/rss_viewer/WinningTheFutureImprovingLatinoEducation.pdf


Appendix A

List of Major Fields of Study

Humanities

American/U.S. Studies
American Literature
Arabic
Archaeology
Art History/Criticism/Conservation
Bible/Biblical Studies
Chinese
Classics
Comparative Literature
Creative Writing
Drama/Theatre Arts
English Language
English Literature
Folklore
French
German
History, African
History, American
History, Asian
History, European
History, General
History, Latin American
History, Other
History, Science, & Technology & Society
Humanities, General
Humanities, Other
Italian
Japanese
Letters, General
Letters, Other
Middle/Near East Studies
Music
Music, Other
Music Performance
Music Theory & Composition
Musicology/Ethnomusicology
Other Languages & Literature
Philosophy
Religion/Religious Studies
Russian
Slavic (other than Russian)
Spanish
Speech & Rhetorical Studies
Social Sciences

Anthropology
Area/Ethnic/Cultural/Gender Studies
Criminology
Demography/Population Studies
Econometrics
Economics
Geography
International Relations/Affairs
Linguistics
Political Science & Government
Public Policy Analysis
Social Sciences, General
Social Sciences, Other
Sociology
Statistics
Urban/City, Community & Regional Planning
Urban Affairs/Studies

Psychology

Clinical Psychology
Cognitive Psychology & Psycholinguistics
Comparative Psychology
Counseling Psychology
Developmental Psychology & Child Psychology
Educational Psychology
Experimental Psychology
Family Psychology
Human Development & Family Studies
Industrial & Organizational Psychology
Personality Psychology
Physiological Psychology/Psychobiology
Psychology, General
Psychology, Other
Psychometrics and Quantitative Psychology
School Psychology
Social Psychology
Education Fields

**Education**

- Adult & Continuing
- Agricultural Education
- Art Education
- Business Education
- Counseling Education/Counseling & Guidance
- Curriculum & Instruction
- Education, General
- Education, Other
- Educational/Instructional Media Design
- Educational Administration & Supervision
- Educational Assessment/Testing/Measurement
- Educational Leadership
- Educational Psychology
- Educational Statistics/Research Methods
- Elementary
- English Education
- Family & Consumer Science
- Foreign Languages Education
- Health Education
- Higher Education/Evaluation & Research
- Mathematics Education
- Music Education
- Nursing Education
- Physical Education & Coaching
- Pre-elementary/Early Childhood
- Reading Education
- School Psychology
- Science Education
- Secondary
- Social/Philosophical Foundations of Education
- Social Science Education
- Special Education
- Teacher Education & Professional Development
- Trade & Industrial Education
CHAPTER 3: WHERE DO ALUMNI OF HISPANIC SERVING INSTITUTIONS EARN
SOCIAL SCIENCE DOCTORATE DEGREES?

There is little empirical research that focuses on where Latinas and Latinos earn doctorate
degrees in the social sciences. Latinas and Latinos are the largest and fastest-growing minority
group in the United States, but they do not earn doctorates relative to their share of the
analyzed national data from the 1980s and found that “Chicanas/os [were] underrepresented in
the production of doctorates overall and in the social sciences in particular [emphasis added]”
(p. 23). The proportion of Latinas and Latinos who earned doctorates increased in recent
decades, but they continued to be underrepresented among graduating cohorts of social scientists.
For example, in 2014 Latinas and Latinos earned less than eight percent of doctorates in social
sciences, even though they made up more than 17% of the population. African Americans and
Asians also earned similar percentages of social science doctorates even though those racial
groups make up smaller percentages of the U.S. population (National Science Foundation, 2015;
U.S. Census Bureau, 2012). Therefore, Latinas and Latinos are underrepresented in the social
sciences relative to their share of the national population, as well as relative to the representation
of other minority racial groups.

It is a national imperative to increase the percentage of Latinas and Latinos who earn
doctorate degrees in the social sciences. Social science doctorate programs prepare students to
produce knowledge and address social issues, take positions as faculty members, and mentor the
next generation of underrepresented students (Gumport, 2002; Woodrow Wilson National
Fellowship Foundation, 2005). If Latinas and Latinos do not make up larger percentages of new

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16 Solórzano (1995) defined Chicanas and Chicanos as students of Mexican-American heritage, who are part of the
larger community of Latinas and Latinos.
doctorates, then the United States will draw its faculty and social scientists from a declining share of the population (U.S. Department of Education and White House Initiative on Educational Excellence for Hispanics, 2011).

It is difficult to develop policy recommendations to improve the representation of Latinas and Latinos among social scientists unless scholars develop a better understanding of the types of universities that award social science doctorates to Latinas and Latinos. Students who attend selective colleges and universities are more likely to enroll in graduate school and earn advanced degrees from major research universities (e.g., Bowen & Bok, 1998; Eide, Brewer, & Ehrenberg, 1998; Lang, 1987; Zhang, 2005). Although the literature demonstrates that selective and private universities may offer the most likely pathway to doctorate degrees, most Americans, especially ethnic or racial minorities, attend other segments of the U.S. higher education system (Deil-Amen, 2015; Scott, 2015). In particular, Hispanic Serving Institutions (HSIs) are important points of entry to U.S. higher education for Latinas and Latinos—especially those who later earn doctorate degrees (e.g., Contreras & Gándara, 2006; Lundy-Wagner, Vultaggio, & Gasman, 2013).

Because most HSIs do not award doctorate degrees, it is important to examine whether there are institutional pathways between baccalaureate-granting HSIs and different types of doctorate-granting universities. In this study, I build on previous literature by examining the relationships between attending HSIs and earning doctorates from different types of universities (categorized by research-intensity). To this end, I address the following research question: Were Latina and Latino social scientists more likely to earn their doctorate degrees at non- or less-research intensive universities if they earned their baccalaureate degrees at HSIs?
It is important to study the research-intensity of doctorate universities because a university’s research environment is an important part of the doctoral student experience and is related to doctoral student’s post-graduation plans. Research-intensive universities are important sites for socializing graduate students to academic norms (Antony, 2002; Austin & McDaniel, 2006; Ferrales & Fine, 2005; Sweitzer, 2009; Wulff & Austin, 2004). Moreover, faculty at research-intensive universities tend to be more comfortable preparing their doctoral students to pursue faculty careers (e.g., Ehrenberg, Jakubson, Groen, So, & Price, 2007). Indeed, many faculty members are trained and hired from the same network of research-intensive universities (Bedeian, Cavazos, Hunt, & Jauch, 2010; Burris, 2004). Examining whereLatinas and Latinos earn doctorate degrees may not only lead to policy implications for increasing their representation among social scientists; findings may also hold interesting implications for diversifying the professoriate.

In the sections that follow, I review literature that informs my study design and hypothesis. After that, I describe the data and methods used in the analyses. Previous literature has focused on research universities with very high research activity, but my descriptive analyses of the Survey of Earned Doctorates show that more than 40% of Latinas and Latinos who earned social science doctorates did so at universities with lower research profiles. I also use multinomial logistic estimation to determine Latina and Latino social scientists’ odds of having earned the doctorate at three categories of doctoral institutions relative to universities with the highest research profiles. I find that graduates of HSIs were more likely to earn doctorates at the nation’s less research-intensive universities, which suggests that there is an institutional pathway between HSIs and the often ignored universities that contribute to the U.S. system of doctoral
education. In the final section of the paper, I discuss implications for research, policy, and practice.

There is a Lack of Research on Various Types of Doctorate-Granting Universities

Traditionally, those who study graduate education tend to focus on the most research-intensive universities, and little quantitative research focuses on the role of non-research-intensive universities in doctoral education (Barnes & Randall, 2012). Universities with the highest levels of research activity receive the lion’s share of financial support from the federal government to award fellowships to minority students (Geiger, 2004, 2009; Woodrow Wilson National Fellowship Foundation, 2005). However, qualitative studies suggest that many people—in particular, low-income, first-generation, or racial and ethnic minority students—earn doctorates at universities with lower research profiles (e.g., Grimes & Morris, 1997; Warnock & Appel, 2012).

The United States has a variety of universities that grant doctorate degrees because the national government did not inhibit the growth of graduate education. Indeed, the U.S. system of doctoral education is the result of decentralized educational policy—what Martin Trow referred to as “academic federalism”—which means there is significant variation in the types of institutions that are responsible for doctoral education (e.g., Clark, 1995; Trow, 2010). Since the late 19th century, many institutions that are less-selective, focus on teaching, and have low levels of faculty research offer doctoral programs (e.g., Ben-David, 1977; Berelson, 1960; Geiger, 2004). Despite the heterogeneity in the types of universities that award doctorates, “most doctoral studies have only examined doctoral education at the most elite and prestigious doctoral granting universities” (Barnes & Randall, 2012, p. 70). Therefore, I seek to examine the odds
that alumni of HSIs earned social science doctorate degrees from multiple types of doctoral institutions (e.g., those that produce different levels of research).

Hispanic Serving Institutions and Latina and Latino Doctorate Degree Earners

Much of the quantitative literature on doctoral students does not look specifically at Latinas and Latinos who earned doctorates. Several landmark studies examine original data to better understand the experiences of doctoral students and the dynamics of the American system of doctoral education (e.g., Bowen & Rudenstine, 1992; Nettles & Millet, 2006; Ehrenberg, Zuckerman, Groen, & Brucker, 2009). Because Latinas and Latinos are historically underrepresented in doctoral education, it is not surprising that the prominent studies in the field do not include large enough numbers of Latina and Latino students to enable significant subgroup analyses.

Quantitative research that does focus on Latinas and Latinos who earn doctorates is inadequate, because the studies tend to examine where students begin their journeys to the doctorate, rather than where they complete them. For example, Solórzano (1995) analyzes data from the 1980s to examine the undergraduate origins of Latinas and Latinos in the social sciences. He highlights the role of small private (often, Catholic) colleges that send larger proportions of their students to doctoral programs, compared to large public universities.

Solórzano (1995) also argues that “the role of HSIs in the development of Chicana/o social and behavioral science doctorates must be examined more closely” (p. 28). Thus, scholars are focusing their attention on HSIs as four-year institutions which prepare Latinas and Latinos for doctoral studies.
The Role of Hispanic Serving Institutions

More than half of all Latinas and Latinos who pursue undergraduate degrees attend HSIs (Santiago, Taylor, & Calderón Galdeano, 2016a), which leads scholars and policymakers to view HSIs as an important group of institutions for improving Latina and Latino doctoral attainment (e.g. Contreras & Gándara, 2006; Lundy-Wagner et al., 2013). To receive HSI status, colleges and universities must maintain student bodies that include at least 25% Latina and Latino students. Latinas and Latinos are making up larger percentages of the U.S. population and enrolling in greater percentages at many colleges and universities. Thus, the number of HSIs is increasing as Latinas and Latinos are increasingly represented on some campuses. However, only a small percentage of HSIs award doctoral degrees, so Latinas and Latinos are more likely to earn baccalaureate than doctorate degrees at HSIs (Contreras & Gándara, 2006; Santiago et al., 2016a). Because most HSIs do not directly produce doctorates, it is important to examine where their alumni ultimately earn social science doctorate degrees.

A wide variety of colleges and universities are classified as HSIs, which leads some scholars to argue that HSIs may actually be categorized into six-different types of schools (e.g., Núñez, Crisp, & Elizondo, 2016). Although organizations can often be classified into smaller categories, sociological theory suggests that it is appropriate to group them together if they inhabit the same domain as part of a larger institutional field (Miles, Snow, & Pfeffer, 1974). In the context of higher education, it is appropriate to classify colleges and universities as a single type if they serve similar populations, work toward similar missions, create their own networks, and are considered to be similar by policymakers. HSIs meet these requirements.
HSIs gain the same federal status as minority-serving institutions under Title V of the U.S. Higher Education Opportunity Act. The leaders of HSIs have also created a professional association, the Hispanic Association of Colleges and Universities (HACU), to represent and advocate to policymakers on behalf HSIs (Calderón Galdeano, Flores, & Moder, 2012; Merisotis & McCarthy, 2005). When the federal government awards Title V capacity-building grants to HSIs, non-HSI institutions are not eligible to compete for those funds (Santiago et al., 2016a). In this paper, I consider all four-year HSIs to constitute a single organizational type because they share a similar educational and policy space based on their federal designation, serve similar underrepresented populations, and are eligible to compete for the same pot of federal money, in large part, based on their HSI status.

The Effects of Baccalaureate Institutional Selectivity and Hypothesis

In general, studies find that students who attended selective or private colleges and universities are more likely to enroll in graduate school and earn graduate degrees from major research universities (e.g., Bowen & Bok, 1998; Eide et al., 1998; Lang, 1987; Zhang, 2005). For example, Zhang (2005) found that students who graduate from selective colleges and universities are (a) more likely to enroll in (and graduate from) advanced degree programs; (b) more likely to enroll in doctoral programs; (c) more likely to attend selective research universities. Although literature demonstrates that selective and private universities offer the likeliest pathway to the doctorate, most Americans, especially ethnic or racial minorities and poorer students, attend other segments of the U.S. higher education system (Deil-Amen, 2015; Scott, 2015). In fact, HSIs offer access to Latinas and Latinos, in part, because they are not very selective.
If baccalaureate alumni of selective colleges and universities are most likely to attend doctoral programs at research-intensive universities (e.g., Eide et al., 1998; Zhang, 2005) then the fact that most HSIs are not very selective suggests that their alumni attend doctoral programs at less-research-intensive-universities. Compared to selective institutions HSIs tend to have low graduation rates and are widely outspent by selective universities (Santiago et al., 2016a, 2016b). Therefore, I hypothesize that students are not as likely to earn doctorates from research-intensive universities if they earn baccalaureate degrees from HSIs.

**Data and Methods**

To address my research question, I conducted secondary data analyses of observational Survey of Earned Doctorates (SED) data from 2000 to 2010. SED administered a census of graduates from research-oriented (as opposed to practitioner-focused) doctoral programs at U.S. universities. Respondents were asked questions about their demographics, educational histories, fields of study, and career aspirations (National Opinion Research Center, 2012). The restricted individual-level data, constituted the most comprehensive data set of doctorate earners in the United States.

SED included more than 494,000 doctorate degree earners between 2000 and 2010.Latinas and Latinos have been historically underrepresented in American doctoral education, so when I limited the sample to students who self-identified as “Hispanic” and excluded international students, there were approximately 16,000 domestic Latina and Latino doctorate degree earners in the data file. I did not include international doctoral students in the analysis because it would not make sense to try to compare baccalaureate institutions from other countries.

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17 I chose these years to build upon work that analyzed data from the 1980s (Solórzano, 1995) and 1990s (Solórzano, Rivas, & Velez, 2005). Additionally, the SED sampling frame was significantly revised in 2011 (National Opinion Research Center, 2012). Also, limiting the data to these years worked well with the Carnegie Foundation for the Advancement of Teaching’s (2012) contextual data, which coded institutions based on their status as of 2010.
with the unique category of HSIs in the United States. Moreover, policymakers suggest that we need to focus on improving doctoral attainment of Latinas and Latinos who live in the United States (e.g., Woodrow Wilson National Fellowship Foundation, 2005). Among non-international Latina and Latino respondents, 3,541 graduated from social science programs. I also excluded Latinas and Latinos who earned baccalaureate degrees (N = 5) or social science doctoral degrees (N = 17) from for-profit institutions, leaving a final data set of 3,519 social science doctorate earners. See Appendix A for a complete list of social science fields of study.

**Dependent Variable**

I used a categorical dependent variable, *Research Profile*, to represent four types of universities that awarded doctorates to Latina and Latino students (1 = Non-Research Intensive Universities, 2 = Doctoral Research Universities, 3 = Research Universities with High Research Activity, 4 = Research Universities with Very High Research Activity). I created the *Research Profile* variable using the Carnegie Classifications Data File that was appropriate for the period of study (Carnegie Foundation for the Advancement of Teaching, 2012). The Doctoral Research Universities, Research Universities with High Research Activity, and Research Universities with Very High Research (VHRU) activity were original Carnegie categories. The Carnegie Foundation used principal components analysis on rank order data, which explained 71% of the total variance in research activity of the three categories. The Carnegie Foundation also calculated per-capita research and aggregated research indices to plot a distribution of the research activity of the different types of universities. The VHRUs had the highest index scores on both measures, while the other categories had lower scores. I aggregated all other universities that granted doctorates into a single category I called Non-Research Intensive Universities.
Gonzaga University and Loma Linda University are examples of the non-research intensive universities included in this study. The New School and American University are examples of the category of doctoral research universities. The category of research universities with high research activity includes Claremont Graduate University and Boston College. Finally, the VHRU category includes schools such as Pennsylvania State University and Stanford University. Table 1 includes a breakdown of the dependent variable, Research Profile, for Latinas and Latinos who earned doctorate degrees in the social sciences.

I categorized universities that granted doctorates according to their levels of research intensity, because in the United States less-research-intensive universities were allowed to develop and operate doctoral programs; in doing so, they opened access for students who may not have otherwise had the opportunity to earn doctorates (e.g., Berelson, 1960). Thus, by using the Research Profile variable, I am able to test whether Latinas and Latinos with certain background characteristics or educational experiences were more likely to earn doctorates from universities that host less research. This manner of classifying doctoral institutions is especially important because research tends to favor the most research-intensive universities (Barnes & Randall, 2012).

Approximately three in five (59.34%, \( N = 2,099 \)) of Latina and Latino social scientists earned their doctorates at Research Universities with Very High Research Activity. Just over one in five (21.57%, \( N = 763 \)) earned doctorate degrees from Research Universities with High Research Activity. Additionally, 8.17% \( (N = 289) \) and 10.91% \( (N = 386) \) of Latinas and Latinos earned doctoral degrees in social sciences from Doctoral Research Universities and Non-Research Intensive Universities, respectively. This was important because it showed that Latinas and Latinos earned doctoral degrees at a range of universities, and statistically each category has
a large enough number of cases to allow for statistical analyses. More importantly, the breakdown of the dependent variable demonstrated that even though Research Universities with Very High Research Activity awarded the largest percentage of doctorates to Latinas and Latinos, the other, often ignored, categories of universities trained more than 40% of Latina and Latino social scientists.

**Key Independent Variable: Hispanic Serving Institutions and Reference Groups**

The key independent variable of interest was a categorical variable called *Baccalaureate Institution*, which represented mutually-exclusive categories of universities (1 = Hispanic-Serving Institution, 2 = non-HSI public university, 3 = non-HSI private university). The mutually exclusive categories allowed me to examine the relationship between HSIs and doctoral universities. The categorical independent variable also disaggregated between public and private non-HSI universities because alumni of private liberal arts colleges or private selective universities may have been more likely to be admitted to research-intensive doctoral programs than alumni of public universities (e.g., Posselt, 2016; Zhang, 2005). The estimated coefficients for the *Baccalaureate Institution* variable quantified the relationship between the types of institutions where students earned undergraduate degrees and the types of doctoral institutions where they earned social science doctorate degrees. See Table 1 for descriptive statistics for the dependent variable and covariates.

It is worth noting that baccalaureate colleges can be classified in many different ways. An institution can be classified in terms of its selectivity or research profile, whether it is public or private, a land-grant institution or not, a minority-serving institution or not, and many other characteristics. I coded universities as institutional types that are consistent with prior literature,
are important for this population of students, and are useful because they sort thousands of institutions into policy-relevant categories.

**Control Variables: Student Characteristics**

Although this study was not designed to account for self-selection effects (into undergraduate or doctoral institutions), I controlled for several variables that researchers suggested were related to where students enrolled in doctoral programs. Kallio (1995) argued that factors related to where students chose to attend graduate school were better understood as life stage differences. Kallio (1995) used factor analysis and logistic estimation to analyze institutional survey data. She demonstrated that younger students were willing to move farther to attend graduate school at a very high research-intensive university. In part, Kallio argued that younger students were more willing to move to attend the University of Michigan, because they were less likely to have definite career plans.

Conversely, Kallio (1995) found that older students were more likely to balance their educational aspirations with other career and family considerations. For example, older students tended to place greater importance on their work arrangements (e.g., whether they could continue at their current jobs; whether they could arrange for flexible, part-time enrollment; or whether they could fund their graduate study through employer tuition programs). Finally, a student’s age was often related to other life circumstances that were related to career goals or employment such as being married or being a parent. As with working-class students (e.g., Grimes & Morris, 1997; Warnock & Appel, 2012), older students may have been less likely to pursue doctorates at research-intensive universities so that they could prioritize other considerations.
In addition to age or life stage differences, gender was a salient background characteristic in educational outcomes. Leslie, McClure, and Oaxaca (1998) examined Latina and Latino students in science, technology, engineering, and math (STEM) fields and found that “gender roles tend to be most sharply distinguished among Hispanics” (p. 258). Leslie and colleagues (1998) determined that gender was related to self-efficacy and self-concept, and across racial or ethnic groups, the largest differences in students’ self-efficacy and self-concept existed between Latinas and Latinos. Grimes and Morris (1997) interviewed a Latina sociologist who suggested that her gender was one of the most defining factors in her educational career, second only to her working-class background—but more influential than her status as an ethnic minority. According to Grimes and Morris (1997), women in general may be more likely to make educational and career sacrifices in favor of family commitments, and according to Leslie and colleagues (1998), Latinas, in particular, may be more strongly socialized to prioritize family commitments and may have lower self-efficacy or self-concept than Latinos. Based on these studies, Latinas may have been less likely to earn their doctorates at the nation’s leading research universities.

Mullen, Goyette, and Soares (2003) used multinomial logistic estimation to find that parental education was a significant predictor of a student’s odds of enrolling in a doctoral program, but parental education was not statistically related to enrolling in master’s programs. They noted that their findings were consistent with Bourdieu’s (1984) theory of habitus, which suggested that parental education indirectly influenced students’ educational expectations. Mullen and colleagues (2003) did not test relationships between parental education and type of doctoral institution, but they acknowledged that students with highly educated parents were more likely to have attended baccalaureate programs at selective research universities. Their
underlying logic (based on Bourdieu’s theory of habitus) suggested that parental education may have been related to students’ decisions to enroll in doctoral programs at research-intensive universities. Additionally, Zhang (2005) found that students with more highly educated parents tended to enroll in doctorate programs at research-intensive universities.

I added a vector of variables that represented students’ characteristics in my analyses. First, I included Age (a continuous variable) at the time students entered graduate school. Second, I used a dichotomous variable to represent whether respondents identified as Female (coded male = 0, female = 1). Third, I added a variable that represented Parental Education (measured as the highest level of education received by either parent, ranging from 1 = less than high school diploma to 7 = research doctoral degree).

**Control Variable: Attended Community College**

I also added a dichotomous Attended Community College variable (0 = did not attend community college, 1 = attended community college) to control for the fact that attending a community college may have been related to where students earned baccalaureate degrees. Hilmer’s (1997) econometric study showed that community colleges offered a strategic pathway to higher quality baccalaureate institutions. Hilmer analyzed the longitudinal High School and Beyond dataset to examine students who enrolled at community colleges and transferred to four-year schools. He found that community college transfer students tended to earn baccalaureate degrees at more selective four-year colleges than they could have attended directly from high school. More specifically, Hilmer found that the “quality increase is largest for students who come from poor families, are of low ability, or performed poorly in high school” (p. 66). He concluded that students who first attended community college were able to matriculate at selective baccalaureate institutions where the mean SAT score was 75 points higher (on a 1600
point scale) than at the four-year colleges they could have likely attended after graduating from high school.

Community college attendance was especially relevant for this population because many Latinas and Latinos attended two-year colleges in addition to the college or university where they earned the baccalaureate. In fact, Latinas and Latinos were over-represented in community colleges relative to their share of the national population, as well as in comparison to other racial and ethnic minority groups (American Association of Community Colleges, 2016). Research also showed that many Latinas and Latinos attended community college prior to earning doctorate degrees (e.g., de los Santos & de los Santos, 2006; Solórzano et al., 2005). Therefore, I used the Attended Community College variable to control for potential confounding effects between attending two-year colleges and four-year colleges.
### Descriptive Statistics of Latina and Latino Social Science Doctorate Degree Earners, 2000-2010 (N = 3519)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>Missing (N)</th>
<th>Missing (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Research Intensive Universities</td>
<td>0.11</td>
<td>0.01</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0.11%</td>
</tr>
<tr>
<td>Doctoral Research Universities</td>
<td>0.08</td>
<td>0.00</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0.11%</td>
</tr>
<tr>
<td>Research Universities with High Research Activity</td>
<td>0.22</td>
<td>0.01</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0.11%</td>
</tr>
<tr>
<td>Research Universities with Very High Research Activity (Reference Group)</td>
<td>0.60</td>
<td>0.01</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0.11%</td>
</tr>
<tr>
<td><strong>Background Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>25.35</td>
<td>4.72</td>
<td>18</td>
<td>74</td>
<td>472</td>
<td>13.41%</td>
</tr>
<tr>
<td>Gender: female</td>
<td>0.65</td>
<td>0.01</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>Parental Education</td>
<td>3.70</td>
<td>0.03</td>
<td>1</td>
<td>7</td>
<td>405</td>
<td>11.51%</td>
</tr>
<tr>
<td><strong>Educational Experiences</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-baccalaureate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attended Community College</td>
<td>0.21</td>
<td>0.01</td>
<td>0</td>
<td>1</td>
<td>368</td>
<td>10.46%</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-HSI Public</td>
<td>0.44</td>
<td>0.01</td>
<td>0</td>
<td>1</td>
<td>270</td>
<td>7.67%</td>
</tr>
<tr>
<td>HSI</td>
<td>0.26</td>
<td>0.01</td>
<td>0</td>
<td>1</td>
<td>270</td>
<td>7.67%</td>
</tr>
<tr>
<td>Non-HSI Private (Reference Group)</td>
<td>0.30</td>
<td>0.01</td>
<td>0</td>
<td>1</td>
<td>270</td>
<td>7.67%</td>
</tr>
</tbody>
</table>

### Methods

I used the Stata statistical package to conduct multinomial logistic estimation.

Multinomial logistic estimation can also be understood as a combination of binary logistic regression equations (Agresti, 2007; Dow & Endersby, 2004). This method of analysis estimated the odds of a student earning a social science doctorate degree from one category of doctoral
university, relative to a base or reference category. For this paper, I regressed the categorical dependent variable, *Research Profile* on covariates (listed above) for the pooled sample of Latinas and Latinos who earned social science doctorate degrees between 2000 and 2010. I selected Research Universities with Very High Research Activity as a reference group; therefore, the regression results represented the likelihood of earning a doctorate from one of the three categories of universities relative to earning a doctorate degree at the most research-intensive universities. I provided the general form of the multinomial logistic model used in this paper as Equation 1.

The probability that a Latina or Latino student earned a doctorate from a particular type of doctoral institution is expressed as

$$P(ResearchProfile = j | \beta, \alpha_j, X_{ij}, Z_i) = \frac{e^{\exp(\beta'X_{ij} + \alpha_jZ_i)}}{\sum_{k=1}^{c} e^{\exp(\beta'X_{ik} + \alpha_kZ_i)}}$$  (1)

where $X_{ij}$ is a vector of background characteristics for each Latina or Latino who earned a social science doctorate $i$, and $Z_i$ is a vector of each students’ undergraduate institutions. This equation will be used to produce parameter estimates for $\beta$ and $\alpha_j$ along with their standard errors. See Dow and Endersby (2004).

I estimated three separate models. The first model included only the control variables for student characteristics. The subsequent model included a second set of covariates that represent students’ undergraduate institutions, including *Baccalaureate Institution* and *Attended Community College*. A third model included both the student characteristics and the undergraduate institutions variables.

**Missing Data**

Although SED provided population-level (as opposed to sample) data, it is still appropriate to account for missing data before proceeding with multinomial logistic estimation. I accounted for missing data using the chained equations approach to multiple imputation (Allison, 2001). Multiple imputation with chained equations preserves incomplete cases that would
otherwise be deleted, and it also requires post hoc analysis. I used Rubin’s (1987) rule to calculate appropriate estimates of coefficients and standard errors from the multiply imputed data. Following Johnson and Young (2011), I imputed twenty-five datasets to meet the fully conditional specification standard.

Limitations

This study was limited to examining whether there were institutional pathway between HSIs and various types of doctorate-granting institutions. As such, the study was not designed to understand application or admissions selection effects or to account for students’ academic ability or matriculation decisions. Additional variables would no doubt help explain student behavior and individual outcomes but were not necessary to this initial examination of the types of universities where HSI alumni earn social science doctorates.

Another limitation arises from the fact that the dataset only included graduate students who completed their doctoral programs. The sample did not include all Latinas and Latinos who enrolled or were accepted to doctorate programs in the social sciences. It may be that doctoral programs at VHRUs enrolled larger numbers of students who graduated from HSIs, but those students did not graduate from the doctoral program, which is when graduate students complete SED. However, SED was the ideal dataset for this study, which was designed to look at the underrepresentation of Latinas and Latinos among those who earned doctorate degrees; it is outside the scope of the study to examine application, admission, and retention issues for Latina and Latino doctoral students in the social sciences.
Findings

The multinomial logistic estimation models indicate that Latinas and Latinos who earn baccalaureate degrees from HSIs have higher odds of graduating from doctoral programs that are not located at VHRUs. I use three tables below to summarize parameter estimates from the regression models. In each table, the estimated coefficients represent odds of earning a social science doctorate from one type of university (i.e., Non-Research-Intensive Universities; Doctoral Research Universities; Research Universities with High Research Activity), relative to VHRUs.

Table 2, Table 3, and Table 4 include three columns of parameter estimates. The first column in each table is called “Background Characteristics (M1)” and presents findings for the model that only uses covariates representing background characteristics. The second column, “Undergraduate Institutions (M2)” includes point estimates for a second model that only include covariates representing educational experiences. The third column titled “Background and Undergraduate (M3)” summarizes a model that uses both sets of covariates.

In each column, the parameter estimates under the heading “RRR” represent relative risk ratios. Values greater than one indicate that the variable is associated with an increased likelihood of earning a doctoral degree from a particular type of university, relative to Research Universities with Very High Research Activity. The opposite holds true for estimated RRR values less than one. The estimated coefficients under the heading “SE” represent standard errors, which should be relatively small when compared to the RRRs to indicate that there is not a large amount of variance or heterogeneity in the estimated relative risk ratio. I will continue to refer to Table 2, Table 3, and Table 4 as I address the three research questions in the subsections that follow.
Relationships Between Students’ Background Characteristics and Doctoral Institutions

The first and third models (M1 and M2) included variables that represented students’ age, gender, and parental education. All three models suggest that age has a statistically significant association with the types of doctoral institutions that Latina and Latino students earned social science doctoral degrees. After controlling for gender and parental education, older students were more likely to earn their doctoral degrees at one of the three categories of universities than to earn their doctorate at VHRUs. Because age is coded continuously in years, the estimated RRRs represent factor increases for a student being one year older. Thus, doctoral students such as the middle-aged mothers described by Grimes and Morris (1997) are much less likely to earn a social science doctorate at a VHRU than they are to earn their social science doctorate at less-research intensive universities.

Similarly, Latinas were much less likely to earn a doctorate degree at a VHRUs than Latinos, after controlling for age and parental education. For example, if the other variables stay constant, the relative risk for a Latina to earn a doctorate degree at a Non-Research-Intensive University—instead of a VHGU—is estimated to increase by a factor of 1.86 (Table 2, M1), and the relative risk increases to a factor of 1.96 after controlling for educational experiences (Table 2, M3). The standard errors accompanying the RRR estimates are relatively small, which suggests that the estimate is consistent for most students. Table 3 and Table 4 illustrate a similar pattern: Latinas are more likely to earn doctorates from universities where faculty do less research.

Latinas and Latinos are less likely to earn doctorate degrees at three categories of universities if they have highly educated parents. For example, the parameter estimates indicate that the relative risk of earning a social science doctorate degree at a Doctoral Research
Universities, compared to a VHRU, is estimated to decrease by a factor of 0.90 after controlling for age and gender (Table 3, M1) and by a factor of 0.92 after controlling for other background characteristics and educational experiences (Table 3, M3). Recall that the RRRs are estimated for a one-unit change in the parental education variable, so the more education parents have, the less likely their children are to earn a social science doctorate degree at an institution other than a VHRU.


**Relationships Between Students’ Undergraduate and Doctoral Institutions**

The second and third models (M2 and M3) included dummy variables that represented students’ undergraduate institutions. The first educational experience variable indicates whether Latinas and Latinos attended community colleges. The estimates suggest that after considering baccalaureate institutions, there is not a consistent relationship between attending community college and earning doctorates at different types of institutions. For example, in Table 3 we see that the RRR changes from 1.04 in the second model to 0.89 in the third model. A similar pattern exists for the estimated likelihoods of attending Doctoral Research Universities (Table 4). The *Attended Community College* variable is not statistically significant after controlling for background characteristics and baccalaureate institutions. Based on these estimates, students who attended community colleges do not appear to be any less likely to earn a doctorate at one type of doctoral institution or another.

Latinas and Latinos who earned baccalaureate degrees at HSIs (compared to non-HSI private universities) were more likely to earn a social science doctorate degree at less-research-intensive institutions, than at VHRUs. Among students who earned baccalaureate degrees at HSIs, the relative risk of earning a doctorate at a Non-Research-Intensive-University increased by a factor of 5.33, controlling for educational experiences and background characteristics (Table
2, M3). The relative risks were also large, albeit somewhat smaller than 5.33, for graduating from doctoral programs at Doctoral Research Universities (RRR = 3.63) or a Research University with High Research Activity (RRR = 3.23). See Table 3 and Table 4.

Table 2


<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Background Characteristic (M1)</th>
<th>Undergraduate Institution (M2)</th>
<th>Background &amp; Undergraduate (M3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RRR SE</td>
<td>RRR SE</td>
<td>RRR SE</td>
</tr>
<tr>
<td><strong>Background Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.03 * 0.01</td>
<td>1.03 * 0.01</td>
<td>1.03 * 0.01</td>
</tr>
<tr>
<td>Female</td>
<td>1.86 *** 0.23</td>
<td>1.96 *** 0.26</td>
<td>1.66 *** 0.26</td>
</tr>
<tr>
<td>Parental Education</td>
<td>0.94 0.03</td>
<td>0.99 0.04</td>
<td>0.99 0.04</td>
</tr>
<tr>
<td><strong>Educational Experiences</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Baccalaureate Institution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attended Community College</td>
<td>1.34 † 0.21</td>
<td>1.28 0.20</td>
<td>1.28 0.20</td>
</tr>
<tr>
<td>Baccalaureate Institution (Reference Group: Non-HSI Private)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic Serving Institution</td>
<td>5.31 *** 0.82</td>
<td>5.33 *** 0.84</td>
<td>5.33 *** 0.84</td>
</tr>
<tr>
<td>Non-HSI Public University</td>
<td>0.87 0.15</td>
<td>0.85 0.14</td>
<td>0.85 0.14</td>
</tr>
<tr>
<td>Constant</td>
<td>0.06 *** 0.03</td>
<td>0.11 *** 0.01</td>
<td>0.11 *** 0.01</td>
</tr>
</tbody>
</table>

M1: \( F(9, 8346.4) = 7.31^{***} \)  M2: \( F(9, 11466.7) = 31.64^{***} \)  M3: \( F(18, 20832.4) = 18.17^{***} \)

Note: The reference group for the dependent variable is VHRU. † p < 0.10 * p<0.05 ** p<0.01 *** p<0.001
Table 3

Multinomial Logistic Estimation Testing Latina and Latino Social Scientists Likelihood of Earning Doctorate at Doctoral Research Universities \((N = 3519, 25 \text{ Imputations})\)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Background Characteristics (M1)</th>
<th>Undergraduate Institution (M2)</th>
<th>Background &amp; Undergraduate (M3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RRR</td>
<td>SE</td>
<td>RRR</td>
</tr>
<tr>
<td><strong>Background Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.06</td>
<td>***</td>
<td>0.01</td>
</tr>
<tr>
<td>Female</td>
<td>1.39</td>
<td>*</td>
<td>0.19</td>
</tr>
<tr>
<td>Parental Education</td>
<td>0.90</td>
<td>**</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Educational Experiences</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Baccalaureate Institution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attended Community College</td>
<td>1.04</td>
<td></td>
<td>0.19</td>
</tr>
<tr>
<td>Baccalaureate Institution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Reference Group: Non-HSI Private)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic Serving Institution</td>
<td>3.92</td>
<td>***</td>
<td>0.72</td>
</tr>
<tr>
<td>Non-HSI Public University</td>
<td>0.95</td>
<td></td>
<td>0.18</td>
</tr>
<tr>
<td>Constant</td>
<td>0.04</td>
<td>***</td>
<td>0.01</td>
</tr>
</tbody>
</table>

\(M1: F(9, 8346.4) = 7.31^{***} \quad M2: F(9, 11466.7) = 31.64^{***} \quad M3: F(18, 20832.4) = 18.17^{***}\)

*Note:* The reference group for the dependent variable is VHRU. † \(p < 0.10\) * \(p < 0.05\) ** \(p < 0.01\) *** \(p < 0.001\)
Table 4

Multinomial Logistic Estimation Testing Latina and Latino Social Scientists Likelihood of Earning Doctorate at Research Universities with High Research Activity (N = 3519, 25 Imputations)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Background Characteristics (M1) RRR SE</th>
<th>Undergraduate Institution (M2) RRR SE</th>
<th>Background &amp; Undergraduate (M3) RRR SE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Background Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.02 * 0.01</td>
<td>1.02 * 0.01</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1.35 *** 0.12</td>
<td>1.38 *** 0.13</td>
<td></td>
</tr>
<tr>
<td>Parental Education</td>
<td>0.94 ** 0.02</td>
<td>0.96 0.02</td>
<td></td>
</tr>
<tr>
<td><strong>Educational Experiences</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Baccalaureate Institution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attended Community College</td>
<td>1.02 0.12</td>
<td>0.96 0.11</td>
<td></td>
</tr>
<tr>
<td>Baccalaureate Institution (Reference Group: Non-HSI Private)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic Serving Institution</td>
<td>3.31 *** 0.39</td>
<td>3.23 *** 0.38</td>
<td></td>
</tr>
<tr>
<td>Non-HSI Public University</td>
<td>0.89 0.10</td>
<td>0.87 0.10</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.23 *** 0.07</td>
<td>0.28 *** 0.02</td>
<td>0.15 0.04</td>
</tr>
</tbody>
</table>

M1: $F(9, 8346.4) = 7.31^{***}$  
M2: $F(9, 11466.7) = 31.64^{***}$  
M3: $F(18, 20832.4) = 18.17^{***}$

Note: The reference group for the dependent variable is VHRU. † p < 0.10  * p<0.05  ** p<0.01  *** p<0.001

**Sensitivity Analyses**

I estimated two additional multinomial logistic regression models to test whether the findings in Table 2, Table 3, and Table 4 were robust to different model specifications. The first set of models estimated the effect of earning a baccalaureate degree at a HSI, relative to earning the baccalaureate at a non-HSI private institution (reference category). In the two additional models, I tested whether Latina and Latinos who earned baccalaureate degrees at HSIs were still less likely to earn social science doctorate degrees at VHRUs when they were compared to different reference groups. First, I changed the reference category to non-HSI public institutions, which resulted in point estimates for Latinas and Latinos who earned baccalaureate degrees at HSIs and non-HIS private institutions. Then, I combined the non-HSI public and non-HSI private categories into a single reference group by creating a dichotomous variable (1 = HSI, 0 =
Non-HSI public and non-HSI private); this model specification yielded a single parameter estimate for Latinas and Latinos who earned baccalaureate degrees at HSIs relative to the rest of the sample. Table 5 contains a summary of the results from the sensitivity analyses. Table 5 does not include estimated coefficients for the Age, Female, Parental Education, and Attended Community College variables (results for the control variables were relatively similar to the estimates presented in the far right columns in Table 3, Table 4, and Table 5 and are available from the author upon request).

The results in Table 5 show that the findings in the previous section were robust to different reference groups. When the reference group changes from non-HSI public institutions to non-HSI private institutions, Latina and Latinos who earn baccalaureate degrees at HSIs continue to have higher odds of earning social science doctorate degrees from the three institution types that are not VHRUs. The second robustness check shows that there is a negative relationship between earning a baccalaureate degree at a HSI and earning a social science doctoral degree at a VHRU, even when a dichotomous variable is used to indicate whether Latinas and Latinos graduate from HSIs.
Table 5

Sensitivity Analyses Using Full Model to Estimate Odds of Earning a Social Science Doctorate Degree at Multiple Types of Universities with Different Reference Groups for Baccalaureate Institutions (N = 3519, 25 Imputations)

<table>
<thead>
<tr>
<th>Baccalaureate Institution</th>
<th>Non-Research Intensive Universities</th>
<th>Doctoral Research Universities</th>
<th>Universities with High Research Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RRR</td>
<td>SE</td>
<td>RRR</td>
</tr>
<tr>
<td>First Robustness Check (Reference Group: Non-HSI Public)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSI</td>
<td>6.24 **</td>
<td>0.90</td>
<td>4.10 ***</td>
</tr>
<tr>
<td>Non-HSI Private</td>
<td>1.17</td>
<td>0.20</td>
<td>1.13</td>
</tr>
<tr>
<td>Second Robustness Check (1 = HSI, 0 = Non-HSI Public and Non-HSI Private)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSI</td>
<td>5.85 ***</td>
<td>0.73</td>
<td>3.90 ***</td>
</tr>
</tbody>
</table>

Note: The reference group for the dependent variable, Research Profile, was VHRU. Model statistics for first robustness check: $F(18, 20,832.4) = 18.17^{***}$ and second robustness check: $F(15, 16,021.7) = 21.57^{***}$

The results from the first robustness check also indicate that, for this sample, there is not a statistically significant difference between earning a baccalaureate degree at a non-HSI private institution and a non-HSI public institution. Therefore, results from the sensitivity analysis mirror the lack of statistically significant parameter estimates for the non-HSI public category, relative to the non-HSI private reference group, which are presented in Table 2, Table 3, and Table 4. The non-finding is worth noting because it indicates that the estimated effect for earning a baccalaureate degree at a HSI does not exist for the other two broad categories of undergraduate institutions.

Discussion and Implications

In this paper I examined where Latina and Latino social scientists who earn their baccalaureate degrees at HSIs are likely to earn their doctorate degrees. Scholars tend to focus on the types of colleges and universities that Latinas and Latinos first attend before enrolling in graduate schools (e.g., Castellanos et al., 2006; Lundy-Wagner et al., 2013; Solórzano, 1995; Solórzano et al., 2005). To increase the percentage of Latinas and Latinos who earn social
science doctorates, it is important to examine relationships between undergraduate and doctoral institutions.

Prior studies focus on the most research intensive universities (Barnes & Randall, 2012), but in this study I examine the roles of a wider range of universities with lower levels of faculty research. Zhang (2005) confirms that alumni of selective institutions are more likely to enroll in doctoral programs at the nation’s leading research universities; by examining HSIs as not selective institutions, I find that the converse is true for Latina and Latino social scientists. The multinomial logistic estimates show that there is a statistically significant relationship between earning the baccalaureate at a HSI and earning the doctorate at universities with lower levels of faculty research—which are often overlooked in scholarly literature.

This study provides evidence to suggest that to the extent that HSIs are not very selective, they foster an institutional pathway for Latinas and Latinos to earn doctoral degrees at less-research-intensive universities. This may be concerning in terms of research and policy efforts that focus on increasing diversity among the nation’s higher education faculty members. A university’s research-profile is an important part of the doctoral environment that is related to advising, post-graduation career plans, and socialization. Doctoral students at the most research-intensive universities often receive mentoring and research opportunities that prepare them to be competitive in the faculty job market (e.g., Antony, 2002; Austin & McDaniels, 2006; Bedeian et al., 2010; Burris, 2004; Ehrenberg et al., 2007; Ferrales & Fine, 2005; Sweitzer, 2009; Wulff & Austin, 2004). If HSI alumni who earn doctorates are missing those experiences, then they may be less likely to work in academia.
The American system of education is stratified, which negatively affects Latinas and Latinos at all levels of the educational pipeline (Castellanos et al., 2006). It may come as no surprise that older students and women students are more likely to earn doctorates at universities with lower levels of faculty research. Latinas and Latinos with less-educated parents are also less likely to earn a social science doctorate at research-intensive universities (e.g., Zhang, 2005). This adds evidence in support of prior research, and these findings extend prior literature to Latinas and Latinos (e.g., Grimes & Morris, 1997; Kallio, 1995; Warnock & Appel, 2012).

This preliminary study identifies a relationship between students’ undergraduate and graduate institutions, and additional research should investigate the causal reasons underlying the relationship. If scholars policymakers want to increase the percentages of HSI alumni, women, older students, and those with less-educated parents who earn doctorates at leading research universities, then they may examine whether selective admissions processes disadvantage these groups of Latinas and Latinos (see e.g., Posselt, 2016). Additionally, Santiago and colleagues’ (2016a, 2016b) argues that more research is needed that focused on HSIs and their resources, relative to other types of institutions. Researchers may examine whether the lack of financial resources at HSIs is related to their students’ likelihood of pursuing doctorate degrees at less-research-intensive schools.

**Avoiding a Deficit-Based Approach**

This study examines where Latina and Latino alumni of HSIs earn social science doctorate degrees. I find that HSI alumni are less likely to earn doctorates from the nation’s leading research universities and are more likely to earn doctorates from the nation’s least research-intensive universities. However, earning a doctorate from a VHRU should not be seen as a more successful outcome in American graduate education. All of the individuals included in
this study were highly successful by virtue of the fact that they were among the small percentage of Americans who earn doctorate degrees. Their doctoral training prepares them to pursue professional careers and apply their knowledge and research training to address important social problems.

This paper draws sharp distinctions between the nation’s most and least research-intensive universities. However, those distinctions are not meant to be value judgements on those schools or their faculty and students. Without a doubt, VHRUs deserve attention because they trained nearly 60% of Latinas and Latinos who earn social science doctorate degrees. However, 40% of Latina and Latino social scientists earn doctoral degrees from other types of universities. If less-research-intensive-universities continue to be understudied, then we overlook institutions that contribute to doctoral attainment—and train academic and social leaders—for one of the largest and fastest growing ethnic communities in the country.

**Conclusion**

In the United States, not all doctoral programs are housed in the nation’s most-research-intensive universities. Indeed, it is historically significant that throughout much of the world, governments controlled the growth of new doctoral programs as well as the size of existing graduate programs (e.g., Ben-David, 1977). In the United States, graduate education is mostly deregulated, and universities with lower levels of faculty research offer doctoral programs. In one sense it is not surprising that the stratified system results in alumni of HSIs, Latinas, and older students being more likely to earn doctorates at universities with smaller research portfolios—after all, many Latinas and Latinos in the United States attend schools with fewer resources throughout the educational pipeline. In another sense, we should acknowledge that the less-research intensive universities produce approximately 40% of Latina and Latino social
scientists. The less-research intensive universities that are so often understudied appear to provide opportunities for doctoral studies among students who graduated from HSIs, whose parents were less educated and, disproportionately, for women. Policymakers and researchers should re-consider the roles of the nation’s less-elite colleges and universities as sites of doctoral production.

Universities with lower research profiles may receive fewer resources, yet without these universities, Latinas and Latinos would likely be even more underrepresented among social scientists. Future research should consider whether policies and resources could be devoted to creating new doctoral programs or expanding enrollments at less-elite universities to help increase the percentage of Latinas and Latinos who earn doctorates, relative to their share of the population. At the same time, increasing access to less-research intensive universities will not address the underrepresentation of Latinas and Latinos in doctoral programs at the nation’s leading research universities. When scholars, practitioners, and policymakers conceptualize a Latina-Latino pipeline to the doctorate (e.g., Castellanos et al., 2006), they should consider whether that pipeline tends to increase equity throughout the U.S. system of doctoral education—both at different university types and for various subgroups of the Latina and Latino population. Both will be needed to increase the representation of Latinas and Latinos in academia.
References


Appendix A

List of Social Science Fields of Study

Social Sciences

Anthropology
Area/Ethnic/Cultural/Gender Studies
Criminology
Demography/Population Studies
Econometrics
Economics
Geography
International Relations/Affairs
Linguistics
Political Science & Government
Public Policy Analysis
Social Sciences, General
Social Sciences, Other
Sociology
Statistics
Urban/City, Community & Regional Planning
Urban Affairs/Studies

Psychology

Clinical Psychology
Cognitive Psychology & Psycholinguistics
Comparative Psychology
Counseling Psychology
Developmental Psychology & Child Psychology
Educational Psychology
Experimental Psychology
Family Psychology
Human Development & Family Studies
Industrial & Organizational Psychology
Personality Psychology
Physiological Psychology/Psychobiology
Psychology, General
Psychology, Other
Psychometrics and Quantitative Psychology
School Psychology
Social Psychology

The diversification of the professoriate has been a slow process. In 2013, 3.09% of full professors were Latinas or Latinos. The latest figures illustrate an increase from 2009 when 2.64% of full professors were Latinas and Latinos. National snapshots of entry-level faculty positions are slightly better. In 2013, 4.29% of assistant professors were Latinas or Latinos, representing an increase from 3.95% in 2009 (Snyder, de Brey, & Dillow, 2016). Despite this progress, Latinas and Latinos were still underrepresented compared to their share (17.4%) of the U.S. population (Krogstad & Lopez, 2015). As a matter of public policy, scholars tend to focus on science, technology, engineering, and mathematics (STEM) fields because those fields are seen as integral to the nation’s economic competitiveness or national security (see, e.g., George, Neale, Van Horne, & Malcom, 2001; Olson & Riordan, 2012; Ong, Wright, Espinosa, & Orfield, 2011). However, it is also important to better understand the pathway from graduate education to faculty careers in social science fields (see Appendix A). In fact, during the 20th century, colleges and universities increasingly hired faculty who were social scientists and decreased, in relative terms, the percentage of their faculty who worked in humanities and natural sciences departments (Drori & Moon, 2006; Frank & Gabler, 2006).18

18 After World War II, universities were not just expected to prepare additional experts in fields such as engineering and the physical sciences, they were also expected to train social scientists who could be relied upon to inform aspects of public policy and social development. During the latter half of the 20th century, governmental bureaucracies were re-organized to incorporate scientific expertise in policymaking (Drori, Meyer, Ramirez, & Schofer, 2002). For example, the number doctorates who worked for the United States government nearly doubled between 1954 and 1983 (Haas, 1992).
There are multiple reasons why it is important to cultivate a diverse professoriate. Solórzano (1993) argued that it is important to increase the percentages of community college and four-year faculty members who are Latinas and Latinos to improve the educational attainment of future cohorts of Latina and Latino students. Research suggests that one way to improve educational outcomes for Latina and Latino students is to increase the diversity of the faculty who teach them. Underrepresented students tend to do better in K-12 schools that are staffed by minority teachers or administrators who serve as positive mentors and advocates for more equitable educational institutions (Grissom, Kern, & Rodriguez, 2015; Meier, 1993). The same may hold true in higher education. Fairlie and colleagues estimated models using student- and classroom-fixed effects, to demonstrate “the importance of racial interactions between instructors and students at the college level” and show that underrepresented minority students “perform relatively better in classes when instructors are of the same race or ethnicity” (Fairlie, Hoffman, & Oreopoulous, 2014, p. 2588). Additionally, a qualitative study described how Latina and Latino undergraduates had supportive interactions with faculty mentors who had the same ethnic background (Santos & Reigadas, 2002). However, the reality is that there are too few Latina and Latino faculty members to mentor students who need them.

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19 Too few Latinas and Latinos succeed in American colleges and universities. Despite near-universal access to higher education, many Latina and Latino students do not complete their degrees (Arbona & Nora, 2007; Fry, 2002). Latina and Latino success in higher education is an issue of national importance. In 2010, President Obama’s issued an executive order, which established the White House Initiative on Educational Excellence for Hispanics. The order created an inter-agency working group as well as an advisory commission to help increase the percentage of Latina and Latino students who graduate from colleges and universities and “contribute to the goal of having America again lead the world in the proportion of college graduates by 2020” (White House Office of the Press Secretary, 2010).
Policymakers have also recognized that fostering faculty diversity will draw new researchers from a growing share of the population and will lead to the diversification of research and knowledge (Woodrow Wilson National Fellowship Foundation, 2005). Policymakers should also be concerned with the lack of Latina and Latino faculty because minority faculty members are more likely to focus on the holistic development of their students, are more likely consider it the duty of a professor to improve society, and are more likely to be devoted to conducting basic research at colleges and universities that lack extensive research capacity or doctoral programs (antonio, 2002). Lastly, increasing the representation of Latinas and Latinos in higher education may improve campus racial climates and retention of already hired faculty of color (Fries-Britt, Rowan-Kenyon, Perna, Milem, & Howard, 2011).

In the 21st century, Latinas and Latinos have earned greater numbers of doctorates than ever before (National Science Foundation, 2015), but their transitions from doctoral programs to careers in academia are not well-understood. Groups such as the Ford Foundation, the Woodrow Wilson National Fellowship Foundation, and the federal government have invested large sums of money over many years to increase the diversity of the professoriate through fellowship and research assistantship programs that fund minority students pursuing the doctorate (National Opinion Research Center, 2014; Vélez-Ibáñez, Szecsy, & Peña, 2013; Woodrow Wilson National Fellowship Foundation, 2005). Programs such as the Ford Fellowship Program have been shown to shape the experience of individuals who received those funds (Vélez-Ibáñez, Szecsy, & Peña, 2013). Additionally, students who received awards from the National Science Foundation’s (NSF) Graduate Research Fellowship Program were more likely to complete doctoral programs than applicants who were finalists in the selection process, but did not receive funding. Additionally, students who received NSF fellowships were less likely to have research
or teaching experiences in graduate school (National Opinion Research Center, 2014). However, researchers have not directly examined the relationships between Latina and Latino students’ funding experiences and their odds of pursuing academic career paths after graduate school.

In this paper, I ask: *Were different sources of financial support related to whether Latina and Latino doctoral students planned to take jobs as post-doctoral scholars or faculty members after graduation?* Therefore, I examine data for Latinas and Latinos who earned social science doctorates between 2003 and 2010 and had definitive post-graduation career plans. The outcome variable is a categorical variable that indicates whether newly-graduating social scientists intended to work as (a) faculty members at two-year or four-year colleges in the United States; (b) as post-doctoral researchers, which often lead to faculty positions; (c) or in positions outside academia, including working for businesses, governments, or primary and secondary schools. I bounded the period of study because 2003 marked the first year that the Survey of Earned Doctorates (SED) allowed respondents to indicate their intention to take post-doc positions, and the SED re-examined and updated its sampling frame for the 2011 academic year (National Opinion Research Center, 2012).

Before describing my analytic process and findings, I review relevant literature and introduce the theoretical framework. For this study, I use a modified version of Tinto’s (1993) Longitudinal Model of Doctoral Persistence to select variables for multinomial logistic estimation. My review of the literature and theoretical framework suggested that Latinas and Latinos who received research assistantships to fund their doctoral studies would have the largest odds of taking positions in academia after graduation. However, I find that, research

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20 I use a similar definition for Latinas and Latinos as Garces and Mickey-Pabello (2015) who included Cubans, Puerto Ricans, Mexican-Americans, and other Hispanics—but did not include international doctoral students who have different admissions, funding, and post-graduation work opportunities as U.S. citizens and permanent residents.
assistantships were not as strongly related to post-graduation career plans as expected. My results suggest that prior scholarship (e.g., Breneman, 1976; Tinto, 1993) may have over-emphasized the importance of research assistantships compared to other sources of funding (i.e. such as those that come from teaching assistantships). In the final section, I highlight implications for policy and future research.

Review of the Literature

Financial Support and Latinas and Latinos in Doctoral Education

Researchers who examine graduate school funding tend to focus on the ways that students incur debt and whether various sources of support are related to doctoral student retention. Graduate students have accumulated larger amounts of debt in recent decades (Belasco, Trivette, & Webber, 2014; Wendler et al., 2012). For example, Kim and Ott (2010) found that in some fields of study funding awards and debt levels were related to doctoral students’ time to degree. Mendoza, Villarreal, and Gunderson (2014) tested whether debt levels, assistantships, and fellowships predicted retention among doctoral students. However, these studies did not consider whether students’ post-graduation plans are related to their sources of support for funding their doctoral studies.

Additionally, scholars have studied which groups of students tend to receive funding for their doctoral studies. Fellowships and assistantships increase access for students who may not otherwise be able to attend graduate school—which is ultimately an equity issue. Indeed, ethnographic studies explain how many Latinas and Latinos come from low-income backgrounds and would not have pursued higher education without financial aid or graduate assistantships (Gándara, 1994; Valverde & Rodriguez, 2002). Multiple classic studies also explain that some types of assistantships are more readily available in certain fields of study
(e.g., Berelson, 1960; Breneman, 1976). More recently, Millett and Nettles (2006) surveyed doctoral students and found that Latina and Latino doctoral students were not more or less likely to receive assistantships than White students across eleven fields of study, including but not limited to social science fields.

Several qualitative studies have analyzed doctoral student experiences and career trajectories for Latina and Latino students, providing vivid findings based on Geertz’ (1973) notion of “thick description.” However, studies have tended to conflate different fields of study and various types of degree programs. Moreover, they have relied on convenience samples. For example, Gándara (1994) examined a cohort of 50 students who earned medical doctorates, juris doctorates, and research doctorates (PhDs). Latinas and Latinos who earn doctorates in the law or medicine may certainly go on to be leaders in society, but their journeys to the doctorate are different from students who earned PhDs in other areas of study. Students in medical and law schools are not required to write dissertations based on original empirical study, and professional students do not tend to rely on teaching or research assistantships as sources of financial support for their training. Other authors have relied on autoethnographies (e.g., Espino, Muñoz, & Kiyama, 2010; Valverde & Rodriguez, 2002). While autoethnographic studies improve our understanding of the challenges Latinas and Latinos may face, they do not tell us about post-graduation outcomes for the larger Latina and Latino population. The literature needs a study, such as this, that quantitatively analyzes a nationally-representative group of students.

Why Sources of Financial Support May be Related to Different Post-Graduation Plans

Breneman (1976) applied an economic lens to study how graduate programs worked at the University of California, Berkeley; he found that students with research assistantships were more likely to graduate and more likely to enter academia than students with teaching
assistantships. In non-STEM fields, departments awarded large numbers of teaching assistantships to doctoral students who could help alleviate high teaching loads. Departments had little incentive to ensure that teaching assistants earned their doctoral degrees and entered competitive faculty job markets. Instead, departments admitted new cohorts of graduate students to replace the teaching assistants who left the program. Unlike teaching assistants, students who worked as research assistants gained valuable experiences from their faculty supervisors and were more likely to graduate and get jobs based on their research training (Breneman, 1976).

Since Breneman’s pioneering study, other scholars have also suggested that students are more likely to benefit and be socialized to academic careers if they are awarded research assistantships than if they are given teaching assistantships (e.g., Ampaw, & Jaeger, 2012; Bowen & Rudenstine, 1992; Herzig, 2004). Fellowships might seem to be the most attractive source of financial support for graduate students because they do not require students to assist faculty as teaching or research assistants. Yet, in their national study of graduate students, Millett and Nettles (2006) argued that while research assistantships “might not be as lucrative as fellowships, they constitute an important form of training on how to conduct research” (p. 271). Moreover, they found that research assistantships were “a proxy for nonclassroom research training . . . [and] may influence other doctoral student experiences such as student interactions with peers, their academic interactions with faculty, their interactions with their faculty advisor” (Millett and Nettles, 2006, p. 271). Thus, research assistantships may provide students with training and socialization to prepare them for faculty and post-doctoral positions; this would result in strong positive relationships between research assistantships and careers in academia.
In his study of Chicanas and Chicanos who received competitive Ford fellowships, Solórzano (1993) noted that “only one-third to about one-half of both men and women were engaged in what many feel is the most critical of experiences in graduate school: research assistantships” (p. 22). Similar to this study, Solórzano was motivated by the goal of increasing the representation of Latinas and Latinos among higher education faculty at all levels (i.e., both two-year and four-year colleges and universities). Therefore, he recommended that California state legislators should establish and fund a research assistantship program explicitly for Chicanas and Chicanos who needed opportunities to work and build close mentoring relationships with faculty members.

It is worth noting that some scholars argue that students gain as much—if not more—from teaching assistantships as they do from research assistantships. Some studies suggest that teaching assistantships provide students with opportunities to connect with faculty members through time spent preparing lectures and planning courses. Although these opportunities may not directly train students for careers as researchers, they allow students to develop skills in another aspect of academia, namely, teaching undergraduates (Austin, 2002; Golde, 2005; Mwenda, 2010). In this sense, teaching assistantships may be positively related to faculty careers, even if they are not positively related to research-based post-doctoral positions.

As previously mentioned, graduate students are increasingly relying on loans and accumulating greater levels of debt to finance doctoral studies (e.g., Belasco, Trivette, & Webber, 2014; Wendler et al., 2012). Few scholars have examined the relationship between graduate student loans and post-graduation plans. However, literature in the fields of medicine (Jolly, 2005) and law (Field, 2009) demonstrates that there is some concern that student loans may lead people to sacrifice public-service orientations and instead make career choices that will
help them repay their loan debt more quickly. Field’s (2009) study was particularly compelling because it was based on an experiment at New York University Law School, in which students were randomly assigned to treatment groups. The law students received aid packages that had “equivalent monetary value” but different terms of loan repayment (p. 1). Students who began incurring debt when they enrolled were much less likely to work in public interest law. If a similar pattern holds true, students who relied on loans as their primary source of financial support during their doctoral programs may have been less likely to plan on working as faculty or post-doctoral researchers, and may have sought more lucrative careers outside academia.

**Theoretical Framework**

I drew upon Tinto’s (1993) “longitudinal model of doctoral persistence” as a basis for selecting variables for my analysis. Tinto proposed that graduate students were affected by their background characteristics, the types of institutions they attended, their experiences in graduate school, and their external commitments outside of doctoral programs. As suggested in the literature review, Tinto’s (1993) theoretical framework also posits that research-based graduate assistantships “involve the student in the intellectual life of the department and enables that person to work together with faculty” (p. 238). Thus, this theoretical framework is ideal for analyzing sources of financial support as an independent variable. The other elements of Tinto’s model suggest appropriate control variables (listed and justified in the next section) that may be related to doctoral students’ outcomes.

I modified Tinto’s framework because I was not trying to determine whether Latinas and Latinos completed doctoral programs in the social sciences. Thus, I removed the “interim outcomes” (p. 239) in the model, which suggested that academic and social integration predict whether students advanced to candidacy. In other words, this study focused on post-graduation
plans and did not include students who dropped out of their programs. Because all students who completed their degrees successfully became doctoral candidates, analyzing integration as it related to attrition fell outside the scope of the study. See Figure 1 for a visual depiction of the theoretical framework used in this study.

*Figure 1. Hypothesized Stages and Attributes Related to Doctoral Persistence and Post-Graduation Plans*

*Note: Framework based on modified version of Tinto’s (1993) Longitudinal Model of Doctoral Persistence.*

**Data and Methods**

I analyzed data from the national Survey of Earned Doctorates (SED), which is essentially a census of all students who completed a research-oriented doctoral program in the United States. Graduate schools administer SED to doctoral candidates when they file paperwork for their final dissertation defense. The SED method of data collection is useful because it collects information on large numbers of racial or ethnically underrepresented students, such as Latinas and Latinos. The dataset is not limited to a few waves of data collection for a single cohort; instead, SED includes students who do not earn doctorates until later in life, which results in a more-representative snapshot of the nation’s doctoral degree
earners. I limited analysis of SED to students who earned their doctoral degrees in social science fields between 2003 and 2010. SED first collected data on whether students intended to take post-doctoral research positions in 2003. I also did not analyze data for years after 2010, because the SED sampling frame changed for the 2011 year (National Opinion Research Center, 2012).

The sample includes 1,870 cases of Latinas and Latinos who earned doctorates in social science fields and had definitive post-graduation plans at the time they completed SED. I used an inclusive measure of Latina or Latino identity (Oseguera, Locks, & Vega, 2008). Thus, I analyzed data for students who indicated that they were “Hispanic or Latino,” including those who identified as “Mexican or Chicano,” “Puerto Rican,” “Cuban,” or “Other Hispanic or Latino.” I removed students who identified as international or indicated that they were not citizens or permanent residents for several reasons. International students often have different undergraduate educational experiences, alternate admissions processes or criteria, and are not eligible to receive fellowships by groups such as the Ford Foundation (Solórzano, 1993). Moreover, policymakers suggest that we need to focus on the development of domestic talent for diversifying the professoriate and the future of the academy (e.g., Woodrow Wilson National Fellowship Foundation, 2005).

**Variables**

I used a single categorical dependent variable, *Post-Graduation Plans*, to indicate whether students stated that they would be working as faculty in U.S. higher education, as post-doctoral researchers, or whether they planned on working for an “Other” type of employer (e.g., government, industry). I derived *Post-Graduation Plans* from two SED variables that indicated post-graduation employers and postdoctoral status. For faculty positions, I recoded into a single category anyone with did not plan to pursue a post-doc and had plans to work at a four-year
college or university, medical school, university-affiliated research institute, or community college. I also coded into a single category any sort of postdoctoral research appointment. I referred to these as research-oriented, as opposed to teaching-oriented post-doctoral positions, because they were defined in the survey instrument as temporary positions “primarily for gaining additional education and training in research, usually awarded in academe, industry, government, or a non-profit organization.”

The key independent variable of interest, Source of Support, was a categorical variable that recorded the “primary source” of funding that sustained students during graduate study. This variable represents the research experiences portion of the theoretical framework. Not only are different types of financial support materially important, they are also a proxy for the type of training and mentoring that defined the doctoral experience. SED respondents were asked to select one of several possible source of support funding options, but they did not provide dollar amounts or duration of the support. I aggregated different primary source of support funding options into five categories (1 = Fellowship or Scholarship; 2 = Teaching Assistantship; 3 = Research Assistantship; 4 = Loans; 5 = Other). The “other” category included responses that did not fit in categories 1-4, such as employer support, personal savings, and earnings from working in graduate school. As discussed in the literature review, scholars have suggested that research assistantships allow faculty to train and mentor doctoral students and should have the strongest relationship to post-graduation plans to work in academia (e.g., Ampaw, & Jaeger, 2012; Bowen & Rudenstine, 1992; Herzig, 2004; Millett & Nettles, 2006; Solórzano, 1993).

I also included control variables, as suggested by the theoretical framework (Tinto, 1993) and previous studies, which may have influenced students’ sources of support or journey to the doctorate. For student attributes, I controlled for age, gender, and parental education. Age
(continuously measured) controlled for life stage differences, which may have influenced where students chose to pursue their doctorates or their willingness to move and change careers (e.g., Kallio, 1995). Gender (0 = Male; 1 = Female) is also an important background variable. Even though most doctoral students aspire to faculty careers, among social science PhD graduates, women are less likely to pursue faculty and postdoctoral positions (e.g., Nettles & Millet, 2006).

The last control variable for background characteristics was Parental Education (1 = Less than high/secondary school graduate; 7 = Research doctoral degree), which predicts whether students earn their degrees from research-intensive universities (e.g., Zhang, 2005).

To address the undergraduate educational experiences part of Tinto’s (1993) model, I control for common types of institutions where Latinas and Latinos tend to begin their journeys to the doctorate. Many Latinas and Latinos attend Hispanic Serving Institutions (HSIs) and community colleges—and students who attend community colleges are more likely to attend public universities (e.g., Castellanos, Gloria, & Kamimura, 2006; Cheslock, 2005). Therefore, I included a dichotomous variable Attended Community College (0 = No; 1 = Yes) and a categorical variable Baccalaureate Institution (0 = Non-HSI Private; 1 = HSI; 2 = Non-HSI Public) as control variables.

The Institutional Experiences portion of the model is represented by the categorical variable, Research Profile of Doctoral Institution (1 = Non-Research Intensive Universities; 2 = Doctoral Research Universities; 3 = Research Universities with High Research Activity; 4 = Research Universities with Very High Research Activity). Students who attended research-intensive universities were more likely to be socialized into academic norms and more likely to plan on working as faculty or postdoctoral researchers in U.S. higher education (see e.g., Austin

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21 The Research Profile of Doctoral Institution variable was not highly correlated with the Source of Support variable. Moreover, none of the other variables in the model were highly correlated.
& McDaniels, 2006; Wulff & Austin, 2004). The Baccalaureate Institution and Research Profile of Doctoral Institution variables were coded according to the 2010 version of the Carnegie Classifications Data File (Carnegie Foundation for the Advancement of Teaching, 2012).

The final pair of control variables represent the chevron titled “external commitments” in Figure 1. Tinto (1993) posited that doctoral students are navigating life circumstances outside of graduate school at the same time that they are undergoing research experiences and preparing to graduate and move into careers. Other literature supports the idea that many doctoral candidates have constraints on their job market searches, especially if they must consider spouses or children (e.g., Nerad, 2009; Nerad, Aanerud, & Cerny, 2004). I will account for these concerns by using two dummy variables: Parent and Marital Status. Parent is a dichotomous indicator of whether respondents had dependents at the time they completed the SED (0 = no dependents; 1 = at least one dependent). Similarly, Marital Status was coded as a dummy variable (0 = not married at time of SED; 1 = married at time of SED) to include respondents who stated that they were married at the time they took the survey; people with other statuses (e.g., widowed, separated, divorced) were not coded as married. See Table 1 for a summary of the dependent variable and covariates.

**Methods of Analysis**

I estimated multinomial logit models to regress the dependent variable, Post-Graduation Plans, on the key independent variable, Source of Support, and the other covariates. Multinomial logit estimation is a variant of the log-linear model and is appropriate when the dependent variable represents a set of discrete categories. Because the dependent variable is categorical, multinomial logit models estimated the risk or odds of being in each category...
(planning to be a faculty member, planning to be a post-doctoral researcher) relative to one base category (planning to take a job outside of academia). I calculated relative risk ratios for the multinomial logit models by exponentiating the estimated coefficients.

I specified four models according to Equation 1. The first three models analyzed, separately, the relationships between the dependent variable, *Post-Graduation Plans* and (a) background characteristics; (b) undergraduate educational experiences; (c) doctoral institutional and research experiences, as well as external commitments. In a fourth model, I included all the variables outlined above to determine whether the control variables altered the estimated relationship between *Source of Support* and *Post-Graduation Plans*.

\[
P(\text{Post - Graduation Plans} = j | \beta, \alpha_j, X_{ij}, Z_i) = \frac{\exp(\beta' X_{ij} + \alpha'_j Z_i)}{\sum_{k=1}^{p} \exp(\beta' X_{ik} + \alpha'_k Z_i)}
\]  

(1)

*Note:* In equation one, the vector \( X_{ij} = (X_{i1}\text{StudentAttributes}, \ldots, X_{i9}\text{EducationalExperiences}, \ldots, X_{i10}\text{InstitutionalExperiences}) \) includes variables that control for background and educational characteristics of each Latina or Latino social science PhD earner \( i \), and the vector \( Z_i = (Z_{i1}\text{ResearchExperiences}, \ldots, Z_{i9}\text{ExternalCommitments}) \) represents the key independent variables. This equation will be used as the basis for a multinomial logistic regression model to produce parameter estimates for \( \beta \) and \( \alpha_j \) along with their standard errors. See Dow and Endersby (2004).

I also conducted sensitivity analyses to check the robustness of my results. Because the key independent variable of interest was categorical, I had to select an initial base or reference category. For the *Source of Support* variable, I initially selected “other” as the base category, which resulted in estimates for students who financed their doctoral studies through the other *Source of Support* categories (Fellowship or Scholarship; Teaching Assistantship; Research Assistantship; Loans). I re-estimated the models using alternate reference categories for the *Source of Support* variable. In statistical analyses, findings are said to be robust if the arbitrary parameters of the model—such as a reference category—are slightly altered and the pattern of results leads to similar conclusions. In other words, the results from the first set of models may be said to be robust if the point estimates for the key independent variable of interest remains
relatively similar after changing the reference category. Prior literature and the theoretical framework suggested that research assistantships should have a positive relationship to taking faculty or post-doctoral positions; therefore, I did not select research assistantships as a base category—instead, I used the main model and sensitivity analyses to compare research assistantships to the four other Source of Support categories.

I accounted for missing data using multiple imputation with chained equations (Allison, 2002). Before proceeding with the regression models, I imputed twenty-five datasets to meet Johnson and Young’s (2011) fully conditional specification standard. I used Rubin’s (1987) rule to calculate appropriate parameter estimates from the twenty-five multiple imputed sets of data.
Table 1

Descriptive Statistics of Latina and Latino Social Science Doctorates, 2000-2010 (N = 1870)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>Missing (N)</th>
<th>Missing (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Graduation Plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty in the U.S.</td>
<td>0.31</td>
<td>0.46</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Post-Doc</td>
<td>0.48</td>
<td>0.5</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other Employment</td>
<td>0.21</td>
<td>0.41</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>25.40</td>
<td>4.7</td>
<td>18</td>
<td>74</td>
<td>79</td>
<td>3.31%</td>
</tr>
<tr>
<td>Gender: Female</td>
<td>0.64</td>
<td>0.48</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>Parental Education</td>
<td>3.68</td>
<td>1.81</td>
<td>1</td>
<td>7</td>
<td>79</td>
<td>3.31%</td>
</tr>
<tr>
<td>Attended Community College</td>
<td>0.23</td>
<td>0.42</td>
<td>0</td>
<td>1</td>
<td>54</td>
<td>2.89%</td>
</tr>
<tr>
<td>Baccalaureate Institution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-HSI Public</td>
<td>0.46</td>
<td>0.5</td>
<td>0</td>
<td>1</td>
<td>146</td>
<td>6.12%</td>
</tr>
<tr>
<td>HSI</td>
<td>0.21</td>
<td>0.41</td>
<td>0</td>
<td>1</td>
<td>146</td>
<td>6.12%</td>
</tr>
<tr>
<td>Non-HSI Private (Reference Group)</td>
<td>0.32</td>
<td>0.47</td>
<td>0</td>
<td>1</td>
<td>146</td>
<td>6.12%</td>
</tr>
<tr>
<td>Research Profile of Doctoral Institution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Research Intensive Universities</td>
<td>0.09</td>
<td>0.28</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0.08%</td>
</tr>
<tr>
<td>Doctoral Research Universities</td>
<td>0.07</td>
<td>0.26</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0.08%</td>
</tr>
<tr>
<td>Research Universities with High Research Activity</td>
<td>0.20</td>
<td>0.40</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0.08%</td>
</tr>
<tr>
<td>Research Universities with Very High Research Activity (Reference Group)</td>
<td>0.65</td>
<td>0.48</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0.08%</td>
</tr>
<tr>
<td>Financial Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fellowship, scholarship</td>
<td>0.32</td>
<td>0.47</td>
<td>0</td>
<td>1</td>
<td>74</td>
<td>3.10%</td>
</tr>
<tr>
<td>Teaching assistantship</td>
<td>0.14</td>
<td>0.34</td>
<td>0</td>
<td>1</td>
<td>74</td>
<td>3.10%</td>
</tr>
<tr>
<td>Research assistantship</td>
<td>0.10</td>
<td>0.30</td>
<td>0</td>
<td>1</td>
<td>74</td>
<td>3.10%</td>
</tr>
<tr>
<td>Loans</td>
<td>0.22</td>
<td>0.42</td>
<td>0</td>
<td>1</td>
<td>74</td>
<td>3.10%</td>
</tr>
<tr>
<td>Other (Reference Group)</td>
<td>0.22</td>
<td>0.42</td>
<td>0</td>
<td>1</td>
<td>74</td>
<td>3.10%</td>
</tr>
<tr>
<td>Parent</td>
<td>0.08</td>
<td>0.28</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>Married</td>
<td>0.48</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Limitations

In this study I classified undergraduate and graduate colleges and universities using broad categories of institutional types (HSIs, non-HSI public institutions, and non-HSI private institutions). There were many possible alternatives to classifying baccalaureate institutions. Indeed, there are many salient institutional characteristics that were not included in this study. However, I chose these categories because they were appropriate for Latinas and Latinos who are more likely to begin at community colleges and to transfer to public institutions, and are more likely to attend HSIs in general (e.g., Crisp, Nora, & Taggart, 2009; de los Santos & de los Santos, 2003; Núñez, Sparks, & Hernández, 2011; Núñez & Bowers, 2011).

It is possible that SED’s post-graduation plan variables may not accurately capture where Latina and Latino doctorates were employed after graduation. SED is cross-sectional, and it is impossible to know for certain where students found work or how long they kept those positions. Yet, the SED questionnaire also asks students about starting salaries, work duties, and more detailed questions about employer characteristics; these variables suggest that participants were not merely stating preferences, but they were more likely describing their post-graduation plans with some certainty. Most of the social science doctorates who were classified as entering faculty positions described their primary or secondary work activities in terms that are typically part of faculty member’s duties (i.e., their primary or secondary work duties were research and teaching). The broad post-graduation plans are also limited in that they do not distinguish between taking faculty positions at elite research programs and accepting employment at a community college. However, as with previous studies (Solórzano, 1993), this study is motivated by the underrepresentation of Latinas and Latinos in faculty ranks across U.S. higher education and, specifically, within the social sciences. In this sense, the findings should still be
interesting to researchers and policymakers who seek to diversify the professoriate at all types of colleges and universities.

Findings

I present the results of the multinomial logit models in Table 2 and Table 3. Table 2 includes parameter estimates for the relationship between covariates and respondents’ odds of planning to work as a faculty member, compared to being in the “Other” category of Post-Graduation Plans. Table 3 displays estimates for the relationships between the various sets of covariates and respondents’ odds of being a post-doctoral researcher, relative to taking a job outside academia. Both tables indicate that in cross-sectional models, the background characteristics and the undergraduate educational experiences control variables do not meaningfully change the parameter estimates for the last block of variables—especially the key independent variable of interest Source of Support. In other words, the estimated relationships between various sources of funding were relatively similar in Model 3 (when many of the controls were excluded) and Model 4 (when all of the control variables were included in the full model).

Overall, I found that research assistantships were positively and statistically related to whether doctoral students planned to be faculty members after graduation but not to whether doctoral students planned to take postdoctoral research positions. Consistent with prior literature, I found that fellowships or scholarships were positively related to the odds that doctoral students planned to be faculty members or postdoctoral researchers. Although scholars have taken divergent views over the benefits of teaching assistantships, I find that teaching assistantships had a larger estimated effect than research assistantships on students’ odds of planning to be a faculty member (when both were compared to the reference category). Unlike
research assistantships, teaching assistantships had a positive, statistically significant relationship with plans to be a postdoctoral researcher after graduation.

When controlling for student attributes, undergraduate educational experiences, doctoral institutional experiences, and external commitments, students who were primarily funded by research assistantships—compared to having “Other” sources of funding—had a higher relative risk (by a factor of 1.76) of planning to be a faculty member. Compared to students who were funded by personal savings or employer contributions, the relative risk of having plans to be a faculty member were estimated to increase by even larger factors among students who were awarded scholarships or fellowships (2.22) and students who were funded through teaching assistantships (2.89). There was not a statistically significant difference in the relative risk ratio for students whose primary source of support was loans and those who were funded by other means. The standard errors were relatively small compared to the relative risk ratios for the *Source of Support* variable, suggesting that there was not so much variation in these estimates as to make them unreliable. See Model 4 in Table 2.

Doctoral students with research assistantships (opposed to those with “Other” sources of funding) did not have higher odds of taking jobs as post-doctoral researchers, compared to taking jobs outside of academia. The odds increased that Latina and Latino social scientists would plan to take positions as post-docs, rather than work outside academia, by a factor of 2.29 if they had scholarships or fellowships and by a factor of 2.19 if they had teaching assistantships—again, compared students who had “Other” sources of financial support. There was not a statistically significant relationship between being funded by student loans and the odds of planning to work as a post-doc. See the column farthest to the right in Table 3.
Sensitivity Analyses

When I re-estimated the full model and changed the base category for Source of Support, I found that the estimated relationship between research assistantships and post-graduation plans was no longer statistically significant. In other words, when I changed the comparison funding group to (a) fellowships or scholarships; (b) teaching assistantships; (c) loans, the odds of planning to work as faculty members or post-docs were not estimated to increase for Latina and Latino social scientists who were funded by research assistantships. Thus, the parameter estimates presented in Table 2 and Table 3 for the research assistantship category under the Source of Support variable were not robust to slightly different model specifications.

When the base category was set to “Fellowships or Scholarships,” the relationship between “Teaching Assistantships” and student’s odds of planning to be a faculty member or post-doctoral researcher (relative to having “Other” plans) was not statistically significant. Similarly, “Fellowships or Scholarships” was not statistically significant when the reference group was set to teaching assistantships. Relative to “Loans,” “Teaching Assistantships” and “Fellowships or Scholarships” were estimated to increase the relative risk of planning to work in academia as a post-doctoral researcher or faculty member by factors ranging from 1.91 to 2.49.

The relative risk of taking faculty or post-doc positions (relative to planning to take jobs outside academia) was estimated to decrease for students with “Loans” and “Other” sources of support—when compared to students who had “Scholarships or Fellowships” and students who had “Teaching Assistantships.” See the summaries of the sensitivity analyses in Table 4. The reference category for each model in the sensitivity analyses is indicated by dash marks and the absence of point estimates. The estimates for the control variables are omitted from Table 4, but full results are available from the author upon request.
### Table 2

**Multinomial Logistic Estimation Testing Latina/o Social Scientists Likelihood of Having Job Plans to be Faculty Member at a U.S. College or University (N = 1870, 25 Imputations)**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
<th></th>
<th>Model 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Attributes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.01</td>
<td>0.02</td>
<td>1.03</td>
<td>0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender: Female</td>
<td>0.77</td>
<td>0.10</td>
<td>0.87</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental Education</td>
<td>1.02</td>
<td>0.04</td>
<td>1.01</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Undergraduate Educational Experiences</strong></td>
<td></td>
<td></td>
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<td>1.79</td>
<td>*** 0.30</td>
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<td>1.25</td>
<td>0.22</td>
<td>0.47</td>
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</table>

**Model Summary**

\[
\begin{align*}
F(6, 129545.0) & = 5.80*** \\
F(6, 30997.9)  & = 2.80* \\
F(18, 988003.2) & = 7.46*** \\
F(30, 627505.2) & = 5.89***
\end{align*}
\]

*Note: * p≤0.05  ** p≤0.01  *** p≤0.001*
Table 3

Multinomial Logistic Estimation Testing Latina/o Social Scientists Likelihood of Having Job Plans to be Post-Doctoral Researcher \((N = 1870, 25\) Imputations)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Model 1</th>
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<th>Model 2</th>
<th></th>
<th>Model 3</th>
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<th>Model 4</th>
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<tr>
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<td>* 0.22</td>
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<td>1.48</td>
<td>* 0.23</td>
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<tr>
<td><strong>Institutional Experiences</strong></td>
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<td>0.63</td>
<td>* 0.15</td>
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<td><strong>Research Experiences</strong></td>
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<tr>
<td>Fellowship or Scholarship</td>
<td>2.19</td>
<td>*** 0.40</td>
<td>2.29</td>
<td>*** 0.43</td>
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<tr>
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<td>** 0.53</td>
<td>2.19</td>
<td>*** 0.54</td>
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<tr>
<td>Research Assistantship</td>
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<td>0.35</td>
<td>1.46</td>
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<tr>
<td>Loans</td>
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<td>0.20</td>
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<td>Parent</td>
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<td>*** 0.11</td>
<td>0.49</td>
<td>*** 0.10</td>
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<tr>
<td><strong>Constant</strong></td>
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<td>0.48</td>
<td>1.96</td>
<td>*** 0.20</td>
<td>1.98</td>
<td>*** 0.32</td>
<td>0.55</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Model Summary

\[ F(6, 129545.0) = 5.80^{***} \quad F(6, 30997.9) = 2.80^{*} \quad F(18, 988003.2) = 7.46^{***} \quad F(30, 627505.2) = 5.89^{***} \]

*Note: * \( p \leq 0.05 \quad ** p \leq 0.01 \quad *** p \leq 0.001 \)
Table 4

Sensitivity Analyses Using Full Model with Different Comparison Groups for Source of Support Independent Variable

<table>
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<tr>
<th>Source of Support</th>
<th>Faculty RRR</th>
<th>Faculty SE</th>
<th>Post-Doc RRR</th>
<th>Post-Doc SE</th>
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<td>Fellowship or Scholarship</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Teaching Assistantship</td>
<td>1.30</td>
<td>0.33</td>
<td>0.96</td>
<td>0.24</td>
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<tr>
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<td>0.21</td>
<td>0.64</td>
<td>0.16</td>
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<tr>
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<td>0.52 **</td>
<td>0.11</td>
<td>0.49 ***</td>
<td>0.10</td>
</tr>
<tr>
<td>Other</td>
<td>0.45 ***</td>
<td>0.09</td>
<td>0.44 ***</td>
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<tr>
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<td>0.09</td>
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<td>0.11</td>
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<td>1.31</td>
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<tr>
<td>Loans</td>
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<tr>
<td>Other</td>
<td>0.86</td>
<td>0.18</td>
<td>0.90</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Note: * p≤0.05 ** p≤0.01 *** p≤0.001

Discussion and Conclusion

Prior studies suggested that Latinas and Latinos who had research assistantships would have higher odds of planning to take jobs as faculty members or post-doctoral researchers, compared to doctoral students who had other sources of funding (e.g., Ampaw, & Jaeger, 2012; Bowen & Rudenstine, 1992; Herzig, 2004; Millett & Nettles, 2006). This study makes a contribution to the literature by empirically testing the relationship between different sources of funding and the post-graduation plans of Latina and Latino social scientists. Additionally, the findings are relevant to scholars and policymakers who are interested in leveraging funding to increase the representation of Latinas and Latinos who pursue faculty or research careers (e.g., Solórzano, 1993; Woodrow Wilson National Fellowship Foundation, 2005).
As expected, funding support is related to plans for doctoral students in the social sciences to begin faculty or post-doctoral research careers at the time they earned their doctorates. Students who received fellowships or teaching assistantships had higher odds of working in academia than those whose sources of support were research assistantships or loans. Results from the multinomial logit models show that Latina and Latino doctoral students in the social sciences who received fellowships were more than twice as likely to plan on taking faculty or post-doctoral research careers at the time they earned their doctorates (compared to those with other sources of support); students with teaching assistantships were also more than twice as likely to take post-doctoral positions and nearly three times as likely to plan on entering faculty positions, again, compared to those with “other” sources of support. Students with research assistantships had relatively lower odds of planning to be a faculty member, and research assistantships were not statistically related to planning to work as a post-doctoral researcher. Furthermore, the sensitivity analyses showed that the parameter estimates for receiving research assistantships were not statistically significant when I changed the base category for the Source of Support variable.

The findings in this paper suggest that prior literature may have under-emphasized the importance of teaching-based assistantships (e.g., Breneman, 1976), especially in terms of preparing Latina and Latino faculty members (e.g., Millett & Nettles, 2006; Solórzano, 1993). Within this study, teaching assistantships mattered more than research-based assistantships in determining the odds that Latinas and Latinos would work in academia. Post-graduation plans are a function of both employer and employee preferences, and it is outside the scope of this paper to analyze all the possible job opportunities entertained by doctoral students. However, future research may continue to examine the relationships presented in this paper.
For example, scholars may study whether most colleges and universities prioritize hiring faculty members or post-docs who have experience as research assistants. Alternately, most colleges and universities in the United States are more teaching- than research-focused (e.g., Ruef & Nag, 2015), and scholars may examine whether doctoral students without teaching experience are at a disadvantage for faculty careers. Additionally, scholars may re-consider whether research assistantships foster mentor-mentee relationships between graduate students and faculty supervisors—these relationships are thought to facilitate socialization to faculty norms and careers. For example, in their discussion of faculty mentoring, Millett and Nettles (2006) cited a study of Black doctoral students that stated: “Mentors, unlike advisors, cannot be assigned to specific students. Advisors may be mentors, but many advisor-advisee relationships never evolve to the mentor-protégé relationship” (Willie, Grady, & Hope, 1991, p. 72). These potential explanations are offered as directions for future research rather than findings from my analysis—indeed, they are outside the scope of the present study. Scholars may also expand on this study by applying similar analyses to Latina and Latino students in different fields of study or to other underrepresented minority groups.

Policymakers may consider the types of funding that are awarded to Latina and Latino students. Teaching assistantships should be structured to promote diversity of future faculty members by financially supporting doctoral education for Latinas and Latinos, while also reducing faculty members’ teaching or grading work and reducing the need for loans and graduate student debt. Policymakers may consider that post-doctoral research positions can only help diversify the professoriate if there are ample opportunities for post-docs to transition into tenure-track faculty careers. Yet, over several decades there has been a proportional decline of such faculty positions (e.g., Kezar & Maxey, 2012). Additional efforts are needed to ensure that
the Latina and Latino faculty members of the future—and their students—who will benefit from the same tenure protections that fostered long-term employment relationships at American colleges and universities during the latter-half of the 20th century.
References


Classifications Data File.


Cheslock, J. J. (2005). Differences between public and private institutions of higher education in

Crisp, G., Nora, A., & Taggart, A. (2009). Student characteristics, pre-college, college, and
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analysis of students attending a Hispanic serving institution. *American Educational

century: Overview, challenges, and opportunities. *Journal of Hispanic Higher Education,


*International Perspectives on Education and Society, 7,* 157-185.

Espino, M. M., Muñoz, S. M., & Kiyama, J. M. (2010). Transitioning from doctoral study to the
academy: Theorizing trenzas of identity for Latina sister scholars. *Qualitative Inquiry,
16*(10), 804-818.


Mwenda, M. N. (2010). *Underrepresented minority students in STEM doctoral programs: The role of financial support and relationships with faculty and peers* (Unpublished doctoral dissertation). University of Iowa, Iowa City, IA.


Appendix A

List of Social Science Fields of Study

Social Sciences

Anthropology
Area/Ethnic/Cultural/Gender Studies
Criminology
Demography/Population Studies
Econometrics
Economics
Geography
International Relations/Affairs
Linguistics
Political Science & Government
Public Policy Analysis
Social Sciences, General
Social Sciences, Other
Sociology
Statistics
Urban/City, Community & Regional Planning
Urban Affairs/Studies

Psychology

Clinical Psychology
Cognitive Psychology & Psycholinguistics
Comparative Psychology
Counseling Psychology
Developmental Psychology & Child Psychology
Educational Psychology
Experimental Psychology
Family Psychology
Human Development & Family Studies
Industrial & Organizational Psychology
Personality Psychology
Physiological Psychology/Psychobiology
Psychology, General
Psychology, Other
Psychometrics and Quantitative Psychology
School Psychology
Social Psychology
CHAPTER 5: CONCLUSION

In 2011, the U.S. Department of Education declared it a national imperative to increase the number of Latinas and Latinos who earn graduate degrees (U.S. Department of Education and White House Initiative on Educational Excellence for Hispanics, 2011). Latinas and Latinos are projected to make up increasingly larger percentages of the U.S. population, thus leaders in government and non-profit organizations argue that increasing the percentage of Latinas and Latinos who earn doctorates is an important goal in terms of improving racial equity. Additionally, policymakers and scholars conclude that increasing the percentage of Latinas and Latinos who earn doctorates could help create a more diverse network of professors and researchers, who may produce diverse forms of knowledge that address pressing social problems, teach and mentor minority students, and improve retention of minority faculty members (e.g., Fries-Britt, Rowan-Kenyon, Perna, Milem, & Howard, 2011; Turner, González, & Wood, 2008; Woodrow Wilson National Fellowship Foundation, 2005).

This dissertation consists of three essays that address important issues related to the doctoral education of Latinas and Latinos in the United States between 2000 and 2010. I begin each essay by acknowledging that Latinas and Latinos have historically been underserved at various levels of the educational pipeline. I also argue that improving doctoral education for this population is a timely policy issue. In each essay, I analyze data from the national Survey of Earned Doctorates, excluding international students or those on visas. The first paper examines students in three broad academic fields, including education, humanities, and social sciences. The second and third essays focus exclusively on Latina and Latino doctorate degree earners in the social sciences. The three essays are organized as Chapters 2, 3, and 4, respectively.
In Chapter 2, I examine the various types of colleges and universities that educate Latina and Latino doctorates at the undergraduate level. Prior research suggests that Latina and Latino doctorates disproportionately earn baccalaureate degrees at private colleges (e.g., Solórzano, 1995). Other scholars highlight the role of Hispanic Serving Institutions (HSIs) as baccalaureate colleges of origin for Latinas and Latinos who later earn doctorates (e.g., Lundy-Wagner, Vultaggio, & Gasman, 2013). I find that private universities and HSIs are both important, but many Latina and Latino doctorates actually originate from community colleges and public, non-HSI universities. I also select a small number of universities with the largest numbers of Latina and Latino alumni who later earn doctorate degrees in one of three fields. I show that for many of those universities, state and federal policies are not aligned to support race-conscious admissions, sponsored undergraduate research programs, or grants under the developing Hispanic-Serving Institutions program. I conclude that policymakers should support pathways from two-year colleges and public, broad-access universities to doctoral programs to increase the percentage of Latinas and Latinos who earn doctoral degrees.

In Chapter 3, I examine the relationship between earning the baccalaureate at a HSI and earning a social science doctorate at one of four types of universities. Researchers note that many Latina and Latino doctorates earn baccalaureate degrees at HSIs (e.g., Lundy-Wagner et al., 2013). Less attention focuses on the types of universities where Latinas and Latinos earn doctorate degrees. It is important to examine the types of universities where Latinas and Latinos earn doctorate degrees because scholarship suggests that doctoral students in research universities environments are more likely to be socialized to academic norms and to be prepared to pursue faculty careers (e.g., Wulff & Austin, 2004). I use multinomial logistic estimation to show that among Latina and Latino social scientists, earning the baccalaureate degree at a HSI
was positively related to earning the doctorate at the nation’s least-research-intensive universities, relative to the most research-intensive universities. The results indicate the presence of an institutional pathway between HSIs and the less-research-intensive doctoral universities, which are often understudied (Barnes & Randall, 2011). I end the chapter by noting that the institutional pathway between HSIs and less-research-intensive doctoral universities is important for supporting Latina and Latino doctoral production; however, policymakers and practitioners may focus on promoting pathways between HSIs and the nation’s leading research universities, where Latinas and Latinos may be better prepared to take faculty positions.

In Chapter 4, I focus on the sources of financial support that can facilitate access to faculty careers. More Latina and Latino faculty members are needed to mentor Latina and Latino students and improve their success in higher education, as well as diversify academic research, and improve campus racial climates and retention of minority faculty members (e.g., Fries-Britt et al., 2011; Turner et al., 2008). I use multinomial logistic estimation to test for relationships between various sources of financial support (e.g., research assistantships, teaching assistantships) and Latina and Latino social scientists’ post-graduation plans. Prior literature suggests that there may be a positive, statistically significant relationship between research assistantships and post-graduation plans. In my initial model, I find evidence that doctoral students with graduate research assistantships are more likely to work as faculty members or post-doctoral researchers. However, I also find that the statistically significant relationship between graduate assistantships and post-graduation plans is not robust to various model specifications. Instead, I show that teaching assistantships are consistently related to Latina and Latino doctoral students’ odds of planning to work as a faculty member. I close by discussing implications of my findings for improving Latina and Latino representation in the professoriate.
This work addresses critical and timely policy concerns for the United States. Specifically, it relates to the small percentage of Latinas and Latinos who earn doctorates relative to their share of the population, the role of HSIs in helping to meet the needs of the Latina and Latino community, and the underrepresentation of Latinas and Latinos in the professoriate. All three dissertation papers contribute innovative insights for scholars and policymakers who are concerned with doctoral education, the future of the professoriate, and increasing the representation of Latinas and Latinos throughout higher education. I plan to continue to examine the various types of colleges and universities that make up the American system of higher education and the ways that they contribute to Latina and Latino graduate education.

In Chapters 3 and 4, I discuss the importance of fostering greater diversity—for Latinas, Latinos, as well as other underrepresented groups—among the nation’s faculty and non-faculty researchers. One of the limits of the SED dataset is that it is cross-sectional and could not examine Latinas’ and Latinos’ experiences after graduate school. In future studies, I plan to use different data sets to examine whether attending different types of colleges and universities or receiving different sources of financial support are in fact related to longer-term outcomes among Latina and Latino doctorate degree earners. Finally, I can build on these studies by examining doctorate degree earners in different fields of study, such as science, technology, engineering, and mathematics (STEM) fields, which are of vital importance to national security and the nation’s economic and scientific competitiveness (Olson & Riordan, 2012)
References


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