Programs and Activities Designed to Support Underrepresented Graduate Students: An Assessment of Recent, Peer-Reviewed Studies

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Project Goals

1. To conduct a systematic review of recent peer-reviewed scholarly literature to better understand what specific actions or programs have been implemented by others (e.g., individual faculty, university departments, offices in universities that support diversity and equity) to specifically support underrepresented graduate students in U.S. colleges and universities.
2. Of the peer-reviewed research identified in this literature base, code key characteristics of each journal article according to methodological characteristics and results.
3. Compare the identified articles across four separate disciplines of higher education: Agriculture, Engineering, Environmental and Natural Resources, and Psychology.

Research Questions

1. How many total articles meet our inclusion criteria within and across disciplines during the time period reviewed?
2. What are the methodological characteristics of each includable article?
3. What are the reported findings of each includable article?
4. What are key similarities and differences of the methodological characteristics across the included articles?
5. What are the overall strengths and limitations of the research reviewed for this study?
6. Based on our findings, what are our recommendations for future research and/or for enhanced evaluation of programming and strategies?

Method

Databases and Key Words

The team searched three databases of scholarly literature: ERIC, PsychInfo, and PsychArticles. Following the recommendation of a Professor of Higher Education at NC State who conducts research on higher education and topics related to our research questions, ERIC and PsychInfo were considered to be the two databases that would be most relevant to the research we aimed to find and review. PsychARTICLES was added as a third database, as various relevant results

were also captured by this source. These databases include research from multiple disciplines, particularly when considering these disciplines in the context of higher education. The following search terms were used to identify articles in each of the databases: *underrepresent** and *graduate*, *underrepresent** and *doctoral*, *underrepresent** and *master*, *minority* and *graduate*, *minority* and *doctoral*, and *minority* and *master*.

Inclusion Criteria

Based on existing empirical and theoretical work as well as the project goals stated above, a draft of the inclusion criteria was developed by two members of the team and enhanced with two additional researchers. Two team members with prior experience conducting integrative literature reviews each examined 150-200 articles to apply the drafted inclusion criteria, determine their appropriateness and functionality, and determine the approximate time per search result. Following this exercise, no major revisions were made to the criteria; three project team members added examples and explanations of each criterion for further clarification.

As the goal of the project was not to do a fully exhaustive literature search at this time, but to systematically review recent peer-reviewed research on four specific disciplines, a research report was included if it was published between 2013 and 2016 and met each of the following inclusion criteria:

- The research was reported in English within a peer-reviewed journal.
- The report presented previously unpublished findings.
- The research addressed an activity, resource, strategy, or program that would support graduate student success (Master's and/or PhD level).
- The research explicitly discussed an activity, resource, strategy, or program that is relevant to supporting underrepresented graduate students**.**
- The research discussed the support activity, resource, strategy, or program in the context of graduate education in the U.S.
- The research discussed or evaluated a support activity, resource, strategy, or program implemented in one or more of the following disciplines: Agriculture or Horticulture, Engineering, Environmental and Natural Resources, Psychology, or unstated discipline(s).
- The research either (a) evaluated the outcomes of a specific activity, resource, strategy or program aimed at supporting underrepresented grad students, or (b) collected data on the experience of underrepresented grad students in a particular program or discipline and in the process, identified an activity, resource, or strategy that could support underrepresented grad students.

Inclusion Criteria Training and Procedures

Over the course of the project, five members of the research team met four times to train on inclusion criteria and work through questions and discrepancies. An initial training meeting took place to (a) introduce and discuss inclusion criteria with team members and address questions, (b) introduce an exclusion tally sheet (a form used by each member to keep track of exclusion reasons and numbers) and how to use it, and (c) determine and discuss inclusion/exclusion for five articles as a group.

After the initial meeting, the project manager selected 50 search results from the search terms, *underrepresent** and *graduate*, for team members to independently determine inclusion/exclusion. The team met again to (a) review their results, (b) discuss discrepancies, and (c) evaluate inter-rater reliability. The median inter-rater reliability score following the 50 coded articles was 91% (range = 78-100%). To ensure even greater reliability among the research team, all 50 articles were reviewed as a team and all discrepancies were discussed until consensus was reached. The project manager then assigned all team members an additional 30 search results for the search terms, *underrepresent** and *graduate*, with the goal of reaching 90% agreement across all team members. All members of the coding team exceeded this criterion (range = 93-100%).

Following training and discussions among the research team, the project manager assigned the complete list of "hits" based on the years and search term parameters. A total of 1,635 articles were reviewed across the five team members (159 for *underrepresent** and *graduate*, 95 for *underrepresent** and *doctoral*, 64 for *underrepresent** and *master*, 698 for *minority* and *graduate*, 364 for *minority* and *doctoral*, and 255 for *minority* and *master*). For purposes of continued measurement of inter-rater reliability, the project manager reviewed 40 of each team member's search results and found that inter-rater reliability for each team member remained above the 90% criterion.

Of the 1,635 articles reviewed across the three databases, 17 articles met the inclusion criteria and were coded by the project manager.

Coding

The 17 included articles were categorized as either: (a) a report that evaluated a specific program aimed at supporting the retention of underrepresented graduate students (see Table 1) or (b) a report that included findings from interviews or surveys that identified a particular activity, resource, or strategy supporting retention of underrepresented graduate students (see Table 2). To answer the research questions and identify key methodological characteristics of the 17 included articles, the following data were summarized and reported:

- Author(s)
- Year of publication
- Sample size
- Sample age range
- Discipline(s) (e.g., Psychology, Engineering)
- Underrepresented population (e.g., students with disabilities, African American women)
- Graduate level (e.g., PhD, Master's and PhD)
- University description (e.g., mid-sized public, public and private institutions across the U.S.)
- Methodological design (e.g., qualitative, quantitative)
- Key design elements (e.g., surveys, semi-structured interviews)
- Program of support (when applicable) (e.g., Ronald E. McNair Postbaccalaureate Achievement Program)

Results

Q1.How many total articles meet the inclusion criteria across disciplines?

Out of a search of 1,635 articles, the research team identified a total of 17 includable articles. Of the total articles, 1,499 were excluded because they did not discuss an activity, resource, strategy, or program that supports graduate student success. Forty-one articles were excluded because the research did not explicitly discuss an activity, resource, strategy, or program that is relevant to supporting underrepresented graduate students. Eight articles were excluded because the research did not discuss or evaluate a support activity, resource, strategy, or program in the context of graduate education in the U.S. Fifty articles were excluded because the research did not discuss or evaluate a support activity, resource, strategy, or program implemented in one or more of the following disciplines: Agriculture or Horticulture, Engineering, Environmental and Natural Resources, Psychology, or unstated discipline(s). Finally, 20 articles were excluded because the research did not involve any data collection, whether through qualitative and/or quantitative methods.

Q2. What are the methodological characteristics of each includable article?

Summary of findings (as shown in Tables 1 and 2) are as follows:

- Median sample size = 24 participants (range = 6-307)
- The underrepresented populations discussed across articles represented a wide range of groups, including underrepresented minority or ethnic minority students (n=7), international students (n=2), students with disabilities (n=2), African American women (n=2), undocumented Latina/o students (n=1), Latina/o students (n=1), women (n=1), and men (n=1).
- The studies were either exclusively about or mentioned the following disciplines: Psychology (n=10), Engineering (n=5), unstated discipline (n=4), Agriculture (n=1), and STEM undefined (n=1). No includable studies were about or mentioned Environmental and Natural Resources.
- University contexts varied considerably across studies.

Q3. What are key similarities and differences of the methodological characteristics across the included articles?

The majority of studies (n=11) were qualitative in design, followed by quantitative (n=5), and mixed methods (n=1). Of the qualitative studies, eight collected data via semi-structured interviews; one utilized a combination of semi-structured interviews, archival materials, and recorded mentoring sessions; one utilized a combination of semi-structured interviews and field notes; one used a survey to gather written, open-ended responses; and one employed a collaborative autoethnographic approach as the data collection method. All four of the quantitative studies utilized a survey. The one mixed methods study implemented a survey with multiple choice and open-ended questions.

Q4. What are the reported findings of each includable article?

Table 3 includes a summary of relevant findings by article. Although study results were variable and specific to each research context, several themes were identified, including specific discussions about and/or recommendations for:

- Mentor support (including advisors, faculty, supervisors) (n=12)
- Peer support (n=6)
- Institutional support (n=4)
- Financial support (n=2)

Q5. What are the overall strengths and limitations of the research reviewed for this study?

Strengths

- Multiple studies have collected in-depth, qualitative data regarding underrepresented graduates students' perspectives and perceptions of support programs or activities.

Weaknesses/Limitations

- Only three of the 17 includable articles evaluated a well-defined, replicable program; all other studies identified a support activity or resource by collecting data on the overall experiences of different underrepresented graduate student groups.
- No studies utilized an experimental or quasi-experimental design; therefore, no studies attempted to examine whether a particular program, activity, or service actually *caused* positive (or negative) change for underrepresented graduate students.
- All studies, regardless of methodology, evaluated a program or activity via study participants' *perceptions* of the program or activity; no studies examined students' actual performance or observable outcomes (e.g., retention rates, graduation rates, number of job offers post-graduation, number of publications, number of years to completing degree, etc.).
- Although the qualitative methodology of the majority of studies allowed for rich descriptions of the experiences of underrepresented graduate students, the mostly small (and therefore potentially biased) samples inhibited generalizability.
- The majority of studies that met our inclusion criteria were about Psychology students (10 of 17 explicitly mentioned Psychology). Six articles mentioned Engineering and only one explicitly indicated Agriculture. No study referred to the Environmental and Natural Resources discipline. The remaining articles either did not state the participants' disciplines or indicated STEM without further clarification.

Q6. Based on our findings, what are our recommendations for future research directions and for enhanced evaluation of programming and strategies?

This study did not attempt to identify every single study published about programs, activities, or services that aim to support underrepresented graduate students, but the includable studies offer a representative snapshot of this literature-base. As such, our findings offers several important

implications, particularly with regards to identifying gaps in the literature as well as future research directions.

First, the present review highlights the overall dearth of literature evaluating support programs and activities for underrepresented graduate students. Of the 1,635 articles searched, only 17 (approximately 1% of articles) met our inclusion criteria. Furthermore, only three of the 17 included articles evaluated a well-defined, replicable program. Additional research is thus warranted not only to build more evidence-based practices to enhance the retention and support of underrepresented graduate students, but to evaluate, refine, and expand already existing support programs.

Second, the present literature review underscores the paucity of quantitative studies evaluating support programs, activities, strategies, and resources for underrepresented graduate students. While the qualitative studies in this review make important contributions to the literature base in terms of their exploratory, in-depth examinations of the experiences of underrepresented graduate students, due to their relatively small and/or biased samples (e.g. participants who self-selected into the study, lack of representation of particular demographics, participants from one university, participants from universities in a particular region, etc.), there is limited generalizability and it is difficult to formulate robust conclusions about the effects of a particular support activity or program. The research base would particularly benefit from experimental or quasi-experimental studies that would help to identify programs or activities that have a demonstrably positive effect on underrepresented graduate student retention and achievement. Of course, some researchers may encounter challenges with limited sample sizes, but this challenge can certainly be overcome (e.g., through selection of research questions and design, as well as through collaborative efforts across institutions or associations). In fact, some studies in our sample were able to achieve relatively large sample sizes.

Lastly, the present project revealed that the majority of studies about supporting underrepresented students pertained to the discipline of Psychology. While some of the findings can be transferred across disciplines, more research is needed to reflect a greater diversity of disciplines.

Summary and Conclusions

This project reviewed 1,635 scholarly articles published between 2013 and 2016 on the topic of supporting underrepresented graduate students. Only 17 articles met our inclusion criteria. Although we were able to answer several research questions related to programs and services to support underrepresented students pursuing graduate education in the United States, the limited time and resources for this project influenced the breadth of the literature review. For example, a review of additional databases, more years of scholarship, and other academic disciplines should strengthen our understanding about the types (and effectiveness) of programs, activities, and services to support underrepresented graduate students. Despite this limitation, the project provides a detailed description of methodological characteristics in this research base and uncovered some noteworthy findings:

1. Based on this preliminary review of the literature, there is little peer-reviewed research evaluating activities, resources, strategies, and programs that support underrepresented graduate students (17 includable articles out of 1,635 articles searched represents approximately 1%). In addition, there are few studies that have evaluated an established, replicable support program such as the McNair Scholars program. More research is warranted not only to build new support activities and resources, but to enhance, evaluate, and expand already existing programs.
2. The majority of literature pertains to underrepresented graduate students in Psychology, followed by Engineering. More research is needed on all four disciplines included in this study, but especially on underrepresented graduate students in Agriculture and Environmental and Natural Resources.
3. The qualitative design of the majority of studies (and the corresponding small and/or convenience samples), as well as the nuanced contexts within which each study took place, poses challenges for the generalizability of recommendations to support underrepresented graduate students.
4. All of the studies evaluated support programs and activities based on graduate students' *perceptions* of the effectiveness of those programs or activities. More research needs to examine observable outcomes of the support services and programs.
5. More experimental or quasi-experimental studies are warranted to examine possible cause-effect relationships between programs or services and student outcomes.

References for Each Included Study

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Table 1

Characteristics of Articles that Evaluated a Support Program

Author	Year	N	Age Range	Discipline(s)	Underrepresented Population	Grad Level	University Description	Program	Design	Design Elements
Gittens	2014	18	unstated	unstated	URM*, low-income, first generation	PhD	11 unnamed institutions	Ronald E. McNair Postbaccalaureate Achievement Program (McNair Scholars)	Qualitative	Semi-structured interviews and field notes
Spivey-Mooring & Apprey	2014	4 of 15 were target sample	unstated	unstated	African American women	unstated	University of Virginia	InterEthnic/Interdisciplinary Mentoring Institute for Graduate Education (Mentoring Institute)	Qualitative	Semi-structured interviews
Bancroft et al.	2016	14	unstated	STEM (psychology, engineering, & others)	URM*	Master's & PhD	3 unnamed Ohio universities	Ronald E. McNair Postbaccalaureate Achievement Program (McNair Scholars)	Quantitative	Survey

*Note: URM = underrepresented minority

Table 2

Characteristics of Articles that Evaluated a Broad Support Activity, Resource, or Strategy

Author	Year	N	Age Range	Discipline(s)	Underrepresented Population*	Grad Level	University Description	Methodological Design	Design Elements
Knox et al.	2013	10	24-34	Psychology	International students (China, Taiwan, Malaysia, Chile, Canada, Japan)	PhD	7 unnamed institutions	Qualitative	Semi-structured interviews
Tummala-Nara & Claudius	2013	15	23-35	Psychology, Engineering, & other	Muslim international students (Turkey, Libya, Bangladesh, China, Iran, Morocco, Saudi Arabia)	PhD & PhD grads	public, private, small, midsized, and large in Northeast	Qualitative	Semi-structured interviews
Lund et al.	2014	56	22-72	Psychology	Students with disabilities (physical or orthopedic, deaf or hard of hearing, blind or visually impaired, autism, cognitive or traumatic brain injury, chronic health condition, psychiatric, ADHD, and learning disability)	PhD (enrolled, completed, planning to apply)		Quantitative	Survey

*Note: Names of underrepresented populations are consistent with author's language

Cervantes et al.	2015	2/6 were target sample	22-29	Civil Engineering Psychology	Undocumented Latina/o students	Master's and Master's grad	unstated	Qualitative	Semi-structured interviews
Chan et al.	2015	24 (9 faculty, 15 students)	25-47 (students)	Psychology	Ethnic minority students	PhD	unstated	Qualitative	Semi-structured interviews, review of archival materials, recorded mentoring sessions
Alexander & Hermann	2016	8	22-30	STEM (engineering, agriculture, & other)	African American women	Master's & PhD	PWU* in the south	Qualitative	Semi-structured interviews
Clark et al.	2016	205/307 were target sample	mean age= 25.9, SD*=3.6	STEM undefined	Women	PhD	Mid-sized public	Quantitative	survey
Isaaco et al.	2016	255	mean age= 29.7, SD*=6.28	Psychology	Men	PhD & PsyD	Unnamed institutions across U.S.	Qualitative	Survey eliciting written responses
Lantz et al.	2016	3/8 were target sample	Late 20s-early 30s	Psychology	Students of color	PhD	Louisiana Tech, Cleveland State, U of Louisville, Auburn, Palo Alto University, U of Kentucky, U of North Texas	Qualitative	Collaborative autoethnography

*Note: PWU= predominantly white university, SD= standard deviation

Layton et al.	2016	225	unstated	STEM (engineering & other)	URM*	PhD	Unstated	Quantitative	Survey
Tran et al.	2016	216	20-59	Unstated	Latina/o students	Master's	HSI*	Quantitative	Survey
Truong et al.	2016	26	26-63	Psychology & other	Students of color	PhD & PhD grads	Public & private institutions across U.S.	Qualitative	Semi-structured interviews
Verdinelli & Kutner	2016	35	23-62	Psychology & other	Students with disabilities	Master's & PhD	Online or blended programs at 14 institutions across U.S.	Qualitative	Semi-structured interviews
Yeboah & Smith	2016	149 (grad & undergrad)	20-36	Colleges of Arts and Sciences, Engineering, & other	Minority students	Unstated	Online program at one southeastern university	Mixed Methods	Survey with multiple-choice and open-ended questions

*Note: URM = underrepresented minority, HSI = Hispanic-serving institution

Table 3

Summary of Relevant Findings across all 17 Includable Studies

Author(s)	Discipline(s)	Underrepresented Population	Grad Level	Relevant Findings
Knox et al.	Psychology	International students (China, Taiwan, Malaysia, Chile, Canada, Japan)	PhD	Majority of participants noted the pivotal role advisors played in their success. They generally described their advisor as supportive, accessible, and respectful. A few participants reported that similarities between themselves and their advisor enhanced the relationship, that their advisors' previous experience with international students or with international travel made them feel more comfortable.
Tummala-Nara & Claudius	Psychology, Engineering, & other	Muslim international students (Turkey, Libya, Bangladesh, China, Iran, Morocco, Saudi Arabia)	PhD & PhD grads	Among other challenges, participants reported lack of peer support during graduate studies based on difficulty forming friendships with students from the U.S.
Gittens	unstated	URM*, low-income, first generation	PhD	Participants reported a wide range of positive influences of McNair Scholars program, including increased self-confidence, informed career decision making, enriched writing skills, understanding the doctoral process, and the development of future research projects.
Lund et al.	Psychology	Students with disabilities (physical,orthopedic, deaf,hard of hearing, blind, visually impaired, autism, cognitive or traumatic brain injury, chronic health condition, psychiatric, ADHD, and learning disability)	PhD (enrolled, completed, planning to apply)	Participants commonly cited assistive technology and mentorship or camaraderie with students or professionals with similar disabilities as helpful resources. Asked to rate level of faculty and supervisor support on disability-related issues, participants had a mean score of 3.04 and an SD of 1.25.

*Note: URM = underrepresented minority

Spivey-Mooring & Apprey	unstated	African American women	unstated	Majority of participants reported that the Mentoring Institute was a key factor in their positive adjustment to graduate school. Participants cited research support; having a safe space to discuss academic successes and setbacks; connecting with mentors outside of one's academic department; social programs and gatherings; professional development workshops, presentations, and retreats; and networking opportunities as the main strengths.
Cervantes et al.	Civil Engineering & Psychology	Undocumented Latina/o students	Master's and Master's grad	Participants cited types of resources that they felt are lacking for undocumented students, including limited or nonexistent funding sources; a list of faculty, staff, and administrators who are allies; and university support on job and post graduation opportunities.
Chan et al.	Psychology	URM*	PhD	Faculty mentors and protégés reported various important mentoring functions, including providing support, coaching, and resources for individual professional and career development; providing assistance navigating racism, discrimination, and stress; providing validation; providing access to professional networks; and providing assistance navigating the field of psychology
Alexander & Hermann	STEM (engineering, agriculture, & other)	African American women	Master's & PhD	Participants reported lack of peer, faculty (research mentoring, advising) and institutional support (counseling services and university administrators)
Bancroft et al.	STEM (psychology, engineering, & other)	URM*	Master's & PhD	Majority of participants reported McNair Scholars program prepared them for various aspects of graduate study, including applying to schools, graduate-level research, social interactions with peers and faculty, securing financial support for graduate study
Clark et al.	STEM undefined	Women	PhD	Perceptions of advisor supportiveness predicted higher levels of gender–STEM identity compatibility for women but not men. Higher gender–STEM identity compatibility predicted greater endorsement of STEM importance for women but not for men. Higher STEM importance predicted greater STEM self-efficacy for women, but not for men. STEM importance predicted greater sense of belonging in one's field for both men and women
Isaaco et al.	Psychology	Men	PhD & PsyD	Few (16%) of participants reported lack of role models and mentors, lack of social support (exclusion from personal and professional events), lack of financial support (not qualifying for scholarships), and lack of university/program support (lack of paternity leave)
Lantz et al.	Psychology	Students of color	PhD	Participants of color noted the lack of program acknowledgement and support around violence and racism against the Black community and reported the importance of Grad Students Talk, a graduate student collective, as a space for discussion and support.

*Note: URM = underrepresented minority

Layton et al.	STEM (engineering & other)	URM*	PhD	URM respondents reported lack of endorsement from faculty mentors to pursue faculty careers, suggesting advising relationships can be enhanced to encourage URM graduate students that express an early interest in a faculty career.
Tran et al.	Unstated	Latina/o students	Master's	Latino students benefitted more from faculty mentorship and student support services (particularly writing support) than non-Latino students.
Truong et al.	Psychology & other	Students of color	PhD & PhD grads	Participants reported that racism directed at faculty members of color structurally limited their opportunities and negatively affected their experiences in graduate school, including decreased mentoring (research support, socialization) and complete disappearance of mentoring and support through faculty mentor's departure.
Verdinelli & Kutner	Psychology & other	Students with disabilities	Master's & PhD	Majority of participants noted that online coursework provided a shield against stigmatization and stereotypes, helped manage disability needs, and gain greater control over the learning process. Institutional assistance (peers and instructors) emerged as a persistence factor. Participants expressed the importance of timely responses from instructors, providing video or live chat communication, instructor understanding during unexpected health changes, and peer networking.
Yeboah & Smith	College of Arts and Sciences, College of Engineering, & other	Minority students	unstated	Participants cited lack of instructor support (no orientation, no assistance navigating online platform, little ability to interact with faculty) as a principal barrier to their academic success

*Note: URM = underrepresented minority