

Doctoral Experience and Outcomes of URM Students in STEM Fields: Implications for Future Assessment and Practice

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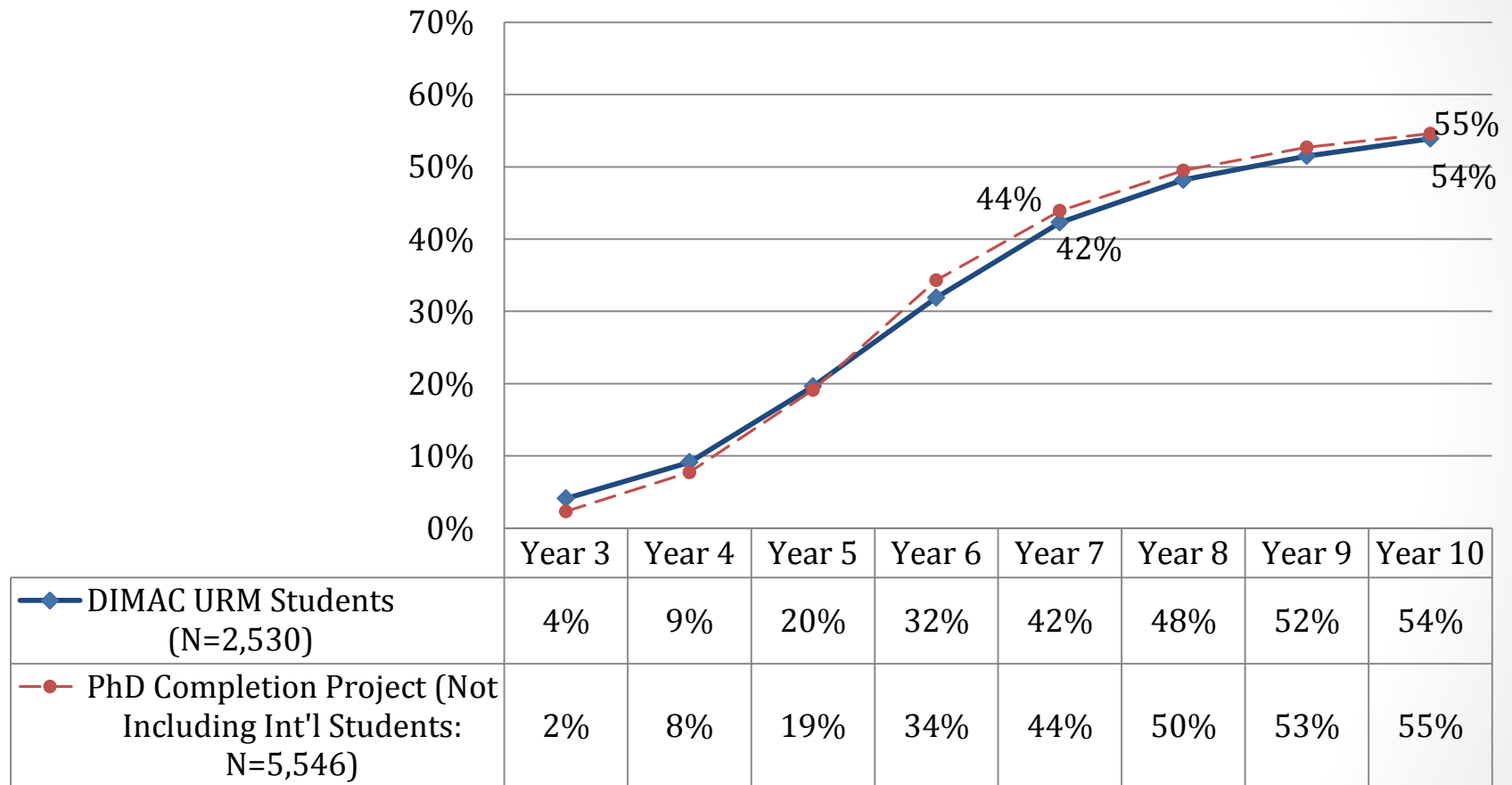
Project Background

- The project builds on the previous CGS PhD Completion Project and aims to further our understanding of completion and attrition of URM STEM doctoral students.
- More specifically, the following research questions were asked in this report:
 - *RQ1. What are the completion and attrition rates for URM students in STEM doctoral programs at the participating institutions?*
 - *RQ2. Do these URM STEM doctoral completion and attrition rates vary by student characteristics?*
 - *RQ3. How have these completion and attrition rates changed over time?*
 - *RQ4. What are the times-to-degree and times-to-attrition for URM students in STEM doctoral programs at the participating institutions?*
 - *RQ5. What activities or initiatives have been implemented by participating institutions to facilitate completion of STEM doctoral programs among URM students?*
 - *RQ6. What activities and initiatives enhance success, in terms of completion, for underrepresented minority students in STEM doctoral programs?*

Project Background (Cont.)

- With support and active participation from 21 institutions, DIMAC compiled the largest data of its kind that includes:
 - Over 7,500 student records,
 - Over 1,600 URM STEM doctoral students surveyed, and
 - Over 320 URM STEM doctoral students participated in focus groups.
- The project, through data collection exercises and site visits, facilitated campus conversations about how to better support URM STEM doctoral students toward their academic and professional success.

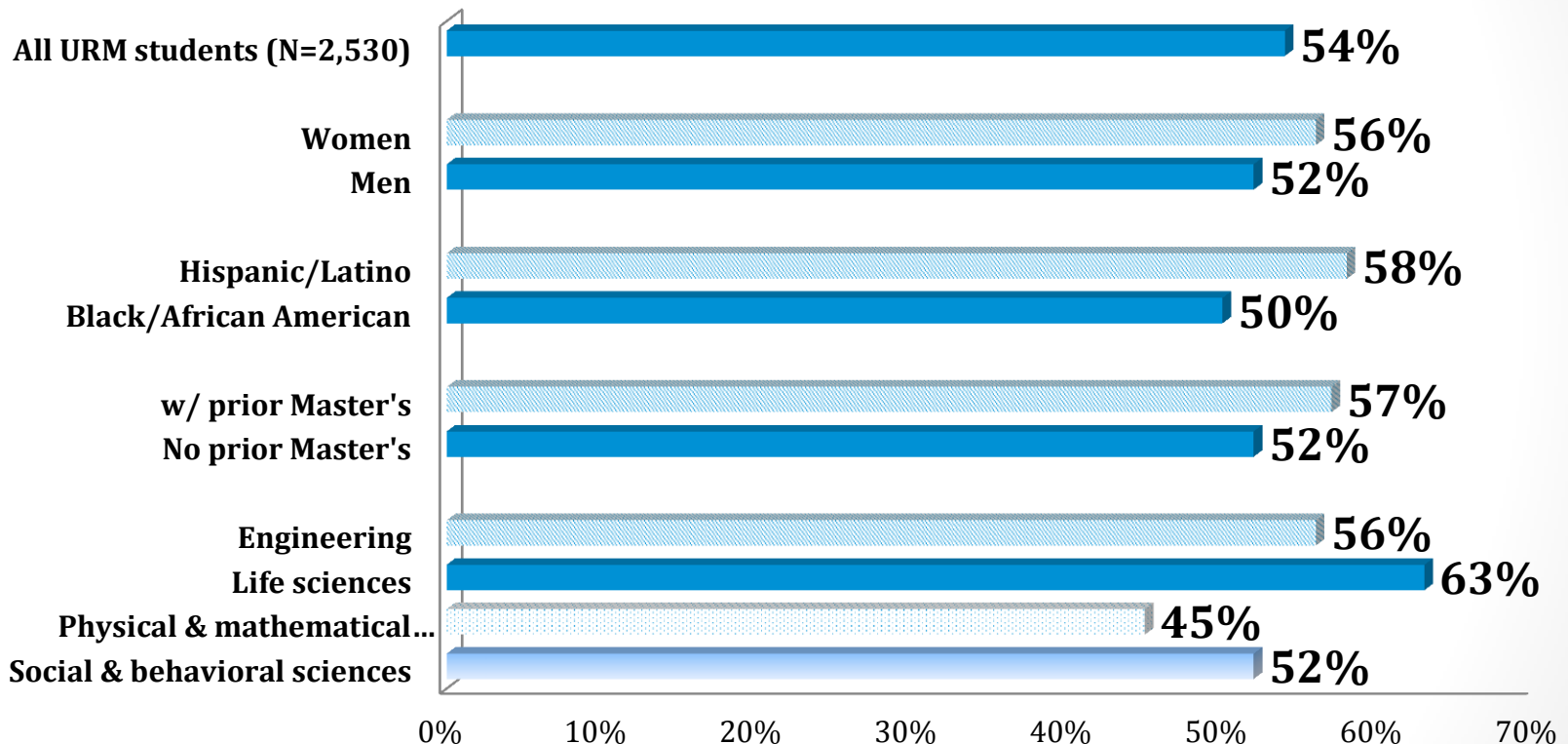
RQ1. What are the completion and attrition rates for URM students in STEM doctoral programs at the participating institutions?



Data Source: Council of Graduate Schools, Doctoral Initiative on Minority Attrition and Completion, 2015 and Council of Graduate Schools, PhD Completion Project, 2008

RQ2. Do these URM STEM doctoral completion and attrition rates vary by student characteristics?

10-year Doctoral Completion Rates of URM STEM Students by Selected Characteristics



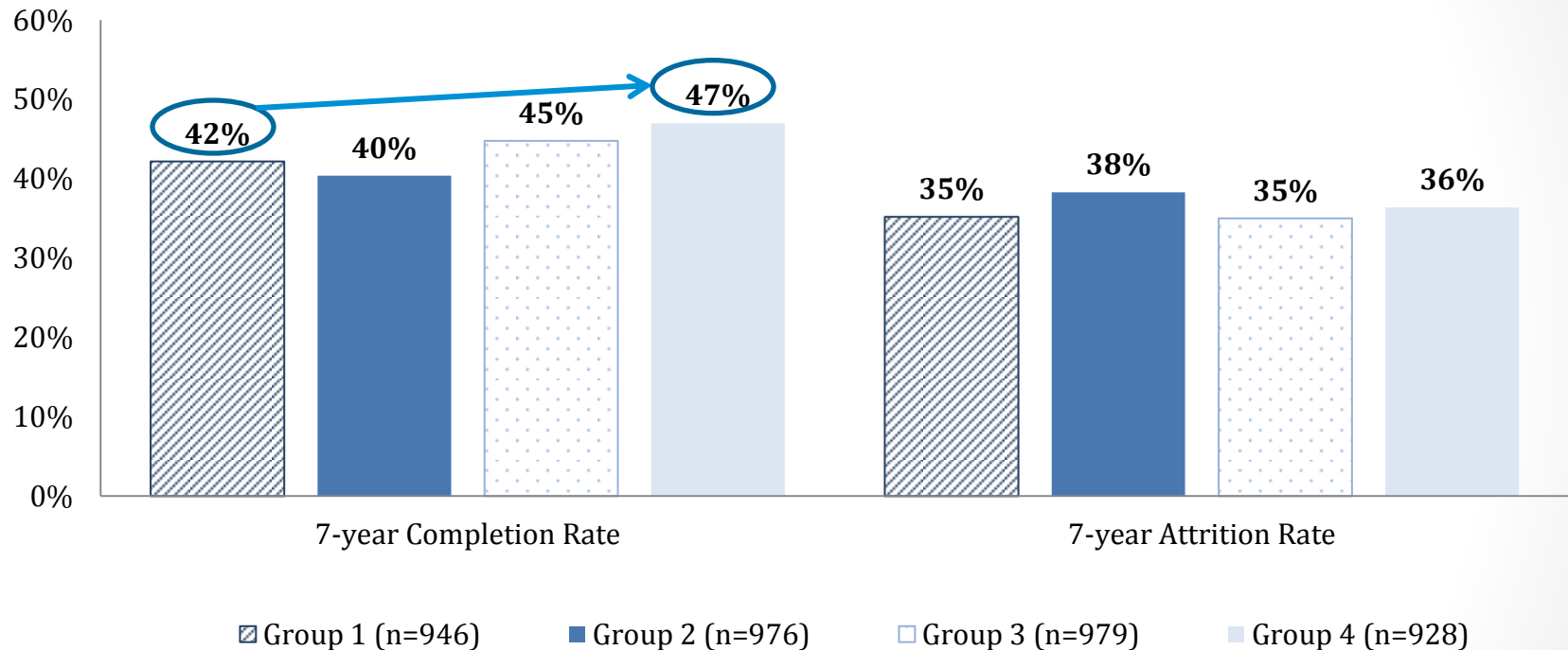
Data Source: Council of Graduate Schools, Doctoral Initiative on Minority Attrition and Completion, 2015

Table #. Multinomial logit analysis for the status of URM STEM doctoral students as of the end of seventh year

	Persistence over attrition				Completion over attrition			
	No interaction terms	With interaction terms			No interaction terms	With interaction terms		
		Gender effects	Field effects			Gender effects	Field effects	
		Over race/ethnicity	Over race/ethnicity	Over gender		Over race/ethnicity	Over race/ethnicity	Over gender
RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	
Broad field of study (reference group: physical & mathematical sciences)								
Engineering	1.516 (0.008)	1.514 (0.009)	1.670 (0.019)	1.660 (0.011)	1.544 (0.000)	1.545 (0.000)	1.865 (0.000)	1.424 (0.012)
Life sciences	1.782 (0.000)	1.778 (0.000)	1.453 (0.078)	2.111 (0.001)	1.871 (0.000)	1.872 (0.000)	1.976 (0.000)	2.036 (0.000)
Social & behavioral sciences	2.621 (0.000)	2.611 (0.000)	2.866 (0.000)	2.226 (0.000)	1.295 (0.014)	1.296 (0.014)	1.530 (0.005)	0.981 (0.898)
Gender (reference group: male)								
Female	1.287 (0.010)	1.205 (0.158)	1.294 (0.009)	1.301 (0.231)	1.301 (0.001)	1.323 (0.012)	1.309 (0.001)	1.083 (0.611)
Race/Ethnicity (reference group: Black/African American)								
Hispanic/Latino	0.905 (0.297)	0.838 (0.198)	0.920 (0.703)	0.899 (0.269)	1.351 (0.000)	1.372 (0.003)	1.646 (0.001)	1.340 (0.000)
Interaction effects								
<i>Gender effects over race/ethnicity</i>								
Hispanic/Latino * Female		1.154 (0.453)				0.972 (0.854)		
<i>Field effects over race/ethnicity</i>								
Hispanic/Latino * engineering			0.832 (0.560)				0.711 (0.136)	
Hispanic/Latino * life sciences			1.501 (0.179)				0.915 (0.688)	
Hispanic/Latino * social & behavioral sciences			0.819 (0.453)				0.724 (0.119)	
<i>Field effects over gender</i>								
Female * engineering				0.769 (0.425)				1.223 (0.397)
Female * life sciences				0.741 (0.323)				0.903 (0.648)
Female * social & behavioral sciences				1.329 (0.288)				1.694 (0.012)

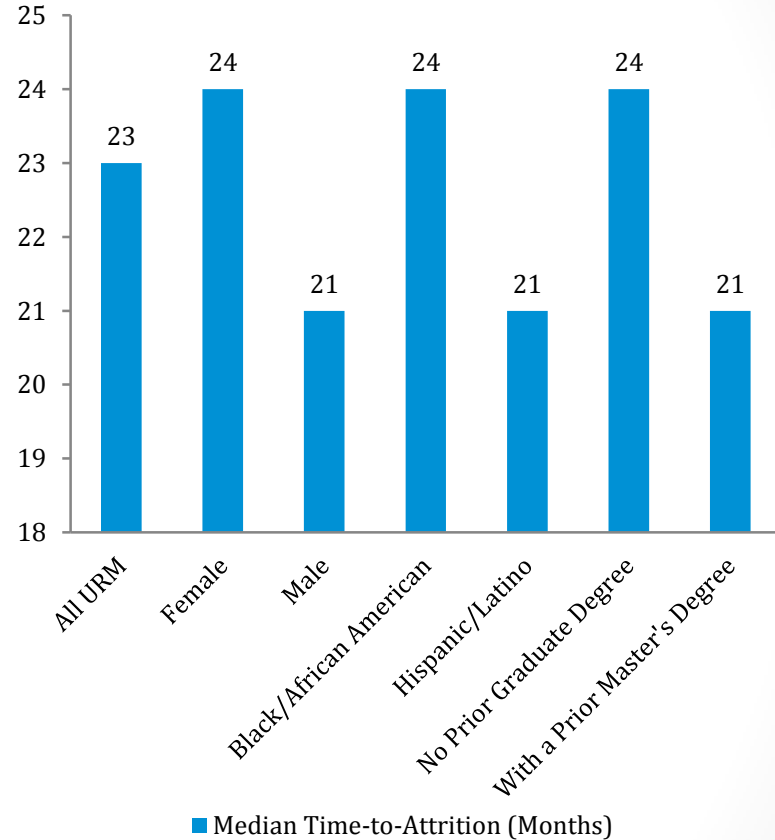
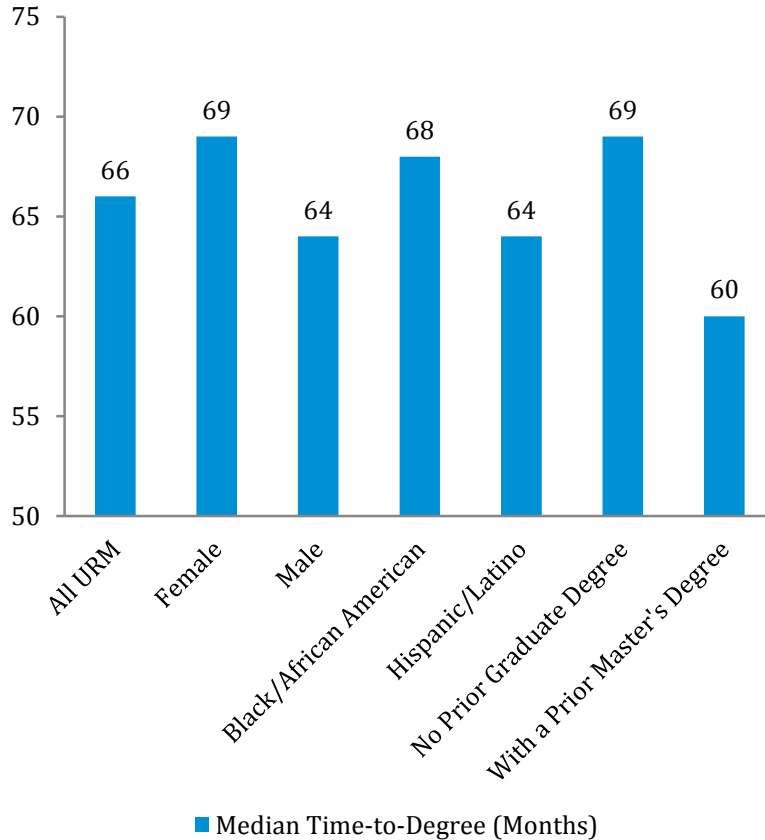
Reference group: male, Black/African American, physical & mathematical sciences

RQ3. How have these completion and attrition rates changed over time?



Data Source: Council of Graduate Schools, *Doctoral Initiative on Minority Attrition and Completion*, 2015

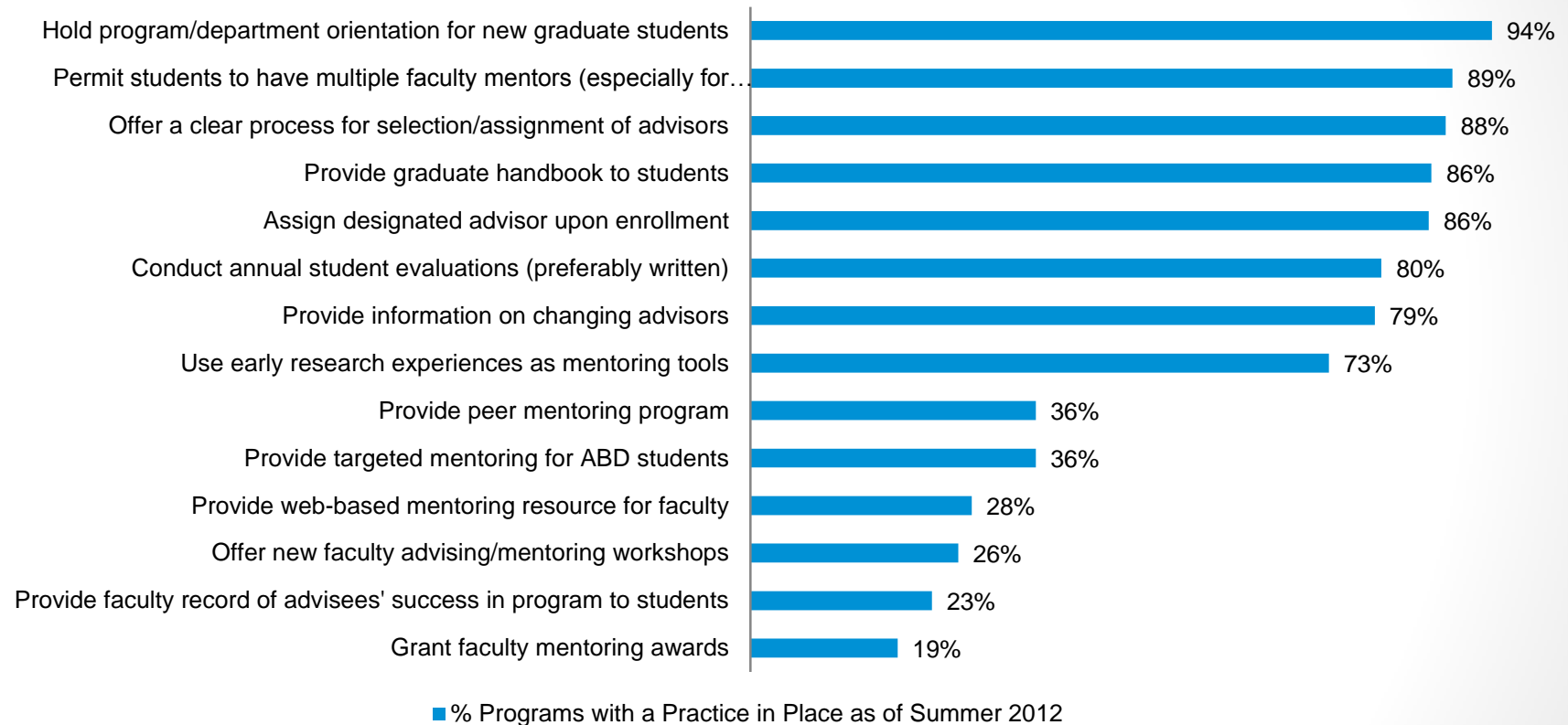
RQ4. What are the times-to-degree and times-to-attrition for URM students in STEM doctoral programs at the participating institutions?



Data Source: Council of Graduate Schools, *Doctoral Initiative on Minority Attrition and Completion*, 2015

Data Source: Council of Graduate Schools, *Doctoral Initiative on Minority Attrition and Completion*, 2015

RQ5. What activities or initiatives have been implemented by participating institutions to facilitate completion of STEM doctoral programs among URM students?

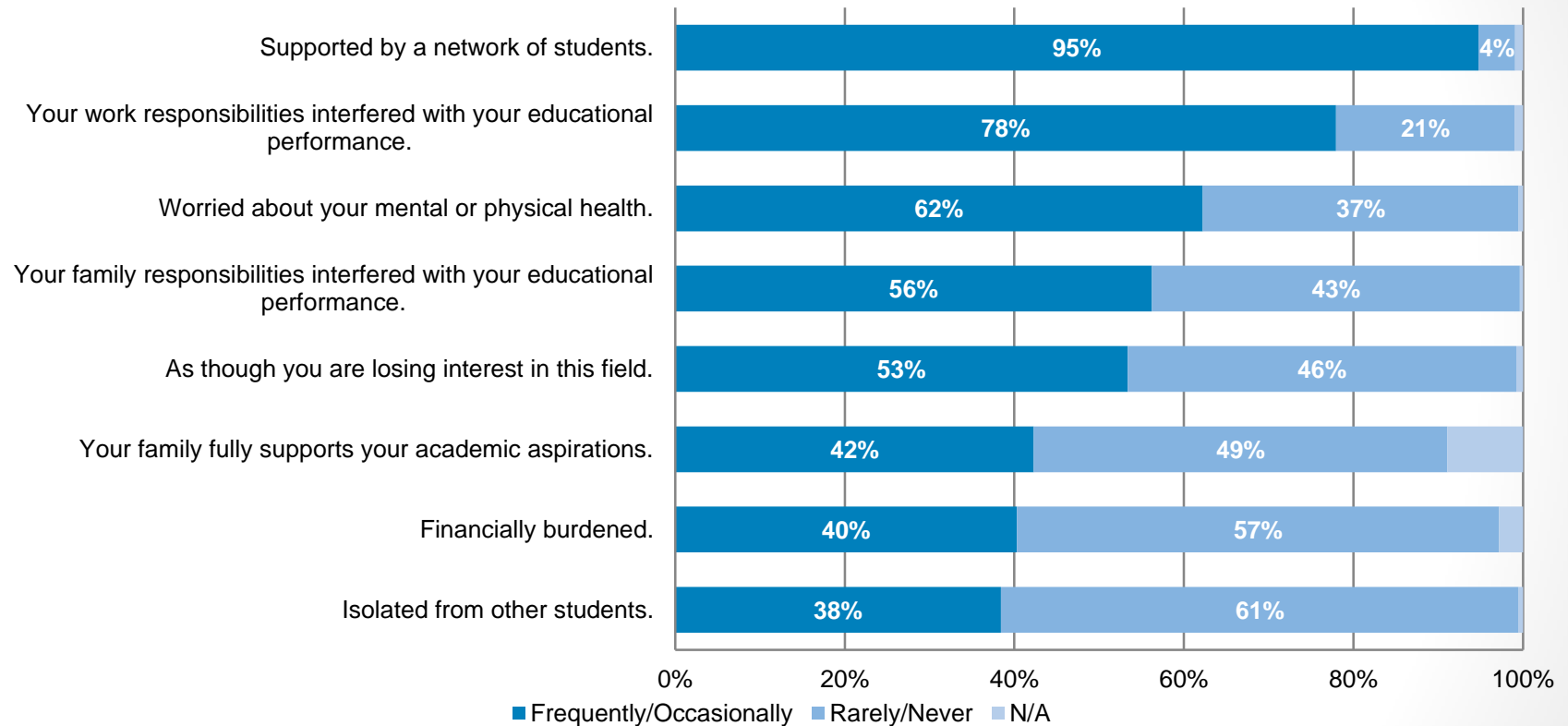


Data Source: Council of Graduate Schools, *Doctoral Initiative on Minority Attrition and Completion*, 2015

RQ5. What activities or initiatives have been implemented by participating institutions to facilitate completion of STEM doctoral programs among URM students?

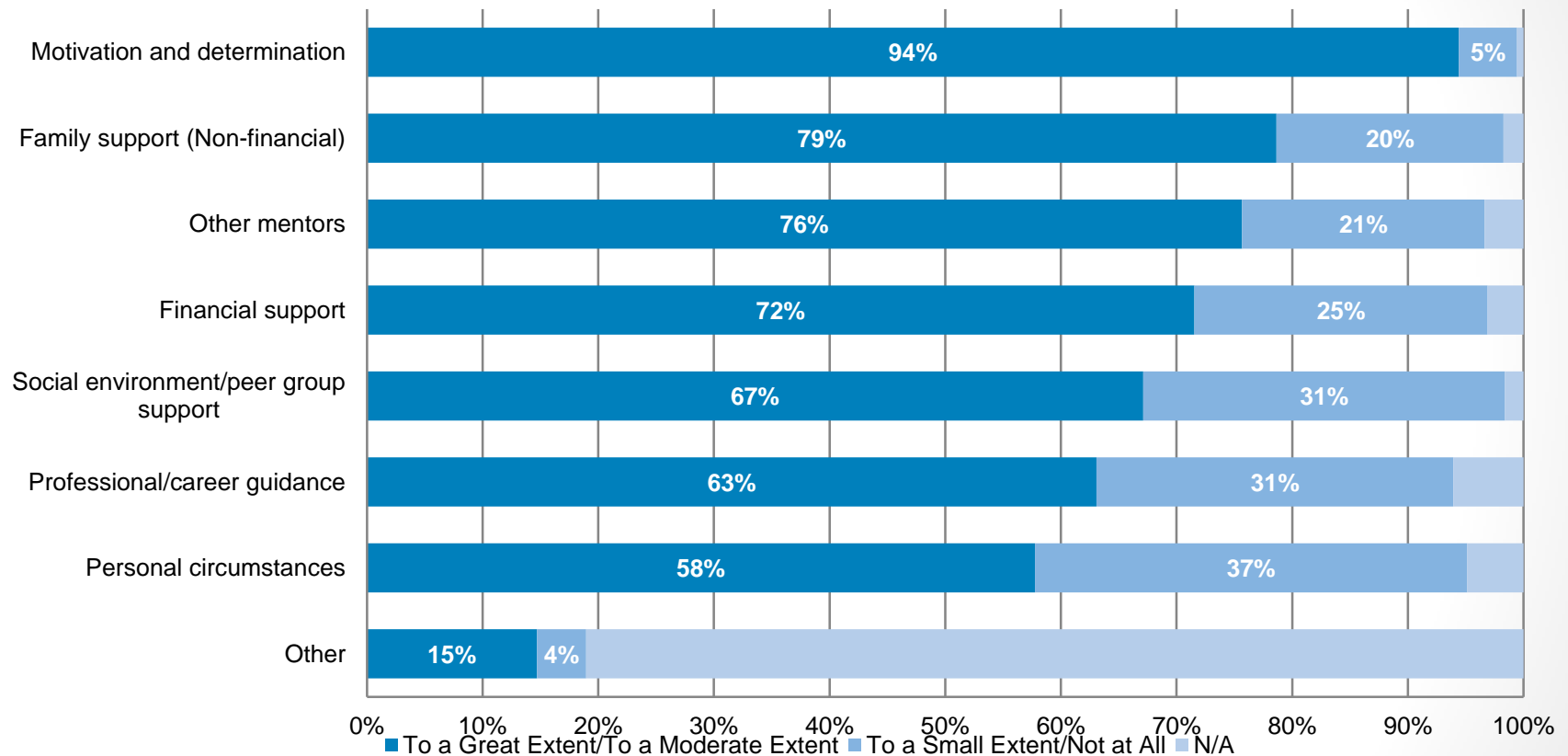
- Graduate schools are engaged in long-standing efforts to promote URM student success; however, they are often early interventions that focus on recruitment, selection, and 1st year transition.
- In latter stages of the doctoral process, students often rely on more informal support mechanisms, such as peer supports, mentorships, advocates/champions, and personal determination.
- Students are generally satisfied with support and interventions offered by graduate programs and faculty members; however, they seem to grow skeptical in latter stages of the doctoral process.

RQ6. What activities and initiatives enhance success, in terms of completion, for URM students in STEM doctoral programs?



Data Source: Council of Graduate Schools, *Doctoral Initiative on Minority Attrition and Completion*, 2015

RQ6 (Cont.): Informal support mechanisms, such as peer supports, mentorships, advocates/champions, and personal determination play an important role.



Data Source: Council of Graduate Schools, *Doctoral Initiative on Minority Attrition and Completion*, 2015

RQ6 (Cont.): Students are generally satisfied with support and interventions offered by graduate programs and faculty members; however, they seem to grow skeptical in latter stages of the doctoral process.

Table 4.1 URM Students' Perception of Program Climate by Candidacy Status

	Disagree/Strongly Disagree	
	Pre-candidates	Candidates
I feel integrated into the program environment in meaningful ways.	12%	17%
My program environment is supportive.	7%	11%
I have opportunities to communicate with individuals within my program about my experience.	5%	7%
I am able to share my perspectives with individuals within my program.	5%	7%
My perspectives are respected and valued.	6%	8%
All students are seen as being equally capable and expected to succeed.	12%	19%
Performance standards are the same for all students regardless of their race/ethnicity.	7%	12%
Faculty are aware of issues facing URM students.	22%	30%
This program is doing a good job helping URM students succeed.	13%	20%
	Agree/Strongly Agree	
	Pre-candidates	Candidates
I have been subjected to racism.	11%	15%
My race/ethnicity is a factor in the manner in which I am treated.	16%	19%

Data Source: Council of Graduate Schools, *Doctoral Initiative on Minority Attrition and Completion*, 2015

RQ6 (Cont.): Students are generally satisfied with support and interventions offered by graduate programs and faculty members; however, they seem to grow skeptical in latter stages of the doctoral process.

Table 4.2 URM Graduate Student Experience by Candidacy Status

	Frequently/Occasionally	
	Pre-candidates	Candidates
As though you are losing interest in this field.	52%	55%
Your work responsibilities interfered with your educational performance.	78%	78%
Financially burdened.	39%	42%
Your family responsibilities interfered with your educational performance.	55%	58%
Worried about your mental or physical health.	59%	65%
Isolated from other students.	32%	45%
	Rarely/Never	
	Pre-candidates	Candidates
Your family fully supports your academic aspirations.	48%	49%
Supported by a network of students.	5%	4%

Data Source: Council of Graduate Schools, *Doctoral Initiative on Minority Attrition and Completion*, 2015

Summary Findings:

- STEM doctoral outcomes differ by selected student characteristics.
- STEM doctoral education is a new and rigorous experience for students.
- Unique challenges URM students face may compound this experience.
- STEM doctoral process can be intensive, solitary, and often complicated.
- The challenge remains for STEM doctoral programs to offer support for URM students beyond early interventions.

Implication for Practice

- Conduct interventions throughout the doctoral process
- Provide enhanced academic support
- Foster a culture of diversity and inclusion

Implications for Future Research and Assessment

- Data collection efforts
 - Beyond enrollment records, we need better accounts of:
 - Students' socioeconomic status
 - Financial aid information
 - Employment status
 - Enrollment intensity
 - Only 52% administers exit interviews/surveys of completers & non-completers
- Targeted analysis and evaluation
 - Modes of interventions, as well as definitions of “participation” vary
 - Needs for rigorous institutional-/program-level assessment
 - Use of qualitative inquiries

THANK YOU FOR YOUR ATTENTION.