

Analyses of Demographic-Specific Funding Rates for Type 1 Research Project Grant and R01-Equivalent Applications

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Introduction

OER presents analyses of funding rates of Type 1 Research Project Grant (RPG) applicants according to the race-ethnicity of designated Principal Investigators (PIs).

Methods

Data Sources

We used data from frozen NIH success rate files. Our analyses focus on Type 1 RPGs and R01-equivalents. [RPGs are defined](#) as defined as applications or awards that use activity codes DP1, DP2, DP3, DP4, DP5, P01, PN1, PM1, R00, R01, R03, R15, R21, R22, R23, R29, R33, R34, R35, R36, R37, R61, R50, R55, R56, RC1, RC2, RC3, RC4, RF1, RL1, RL2, RL9, RM1, SI2, U3R, UA5, UC1, UC2, UC3, UC4, UC7, UF1, UG3, UH2, UH3, UH5, UM1, UM2, U01, U19, and U34. Research projects were first coded to NLM in fiscal year 2007. Not all of these activities may be in use by NIH every year. [R01-equivalents are defined](#) as applications or awards that use activity codes DP1, DP2, DP5, R01, R37, R56, RF1, RL1, U01 and R35 from select NIGMS and NHGRI program announcements (PAs). Not all of these activities may be in use by NIH every year.

We obtained data on the race and ethnicity of PIs from their entries into the eRA Commons Personal Profile. [As noted by NIH](#), PIs provide these data on a strictly voluntary basis, and these data are not used for making funding decisions. If individuals described themselves as Hispanic in the ethnicity field and not Black in the race field, then race-ethnicity was considered to be Hispanic; otherwise the individual's race-ethnicity was based on their entry in the race field.

Grant Outcome Metrics

As a reminder, [NIH publishes three main kinds](#) of grant outcome metrics, namely award rates, success rates, and funding rates. Award and success rates are *application-based* metrics, while funding rates are *person-based*.

The award rate is an application-based measure that is calculated as

$$A_{FY} = \frac{\sum_{i=1}^N a}{N} \quad (1)$$

where N is the number of *unique* applications submitted in a given fiscal year and a is an indicator of whether application i was successfully funded (1 if yes, 0 if no). A data frame that calculates award rate will have only *one* observation per application per year. The success rate is related to the award rate except that an application is not counted if a resubmission was received later in the year; more details on success rate methodology is [found here](#).

The funding rate is a person-based measure that is calculated as

$$F_{FY} = \frac{\sum_{j=1}^P a}{P} \quad (2)$$

where P is the number of *unique* persons (designated-PI applicants) who submitted at least one proposal in a given fiscal year and a is an indicator of whether person (designated-PI applicant) j successfully obtained funding for at least one of those proposals (1 if yes, 0 if no). A data frame that calculates funding rate will have only *one* observation per person per year.

Throughout the report we refer for convenience to Principal Investigators (“PIs”) as applicants or awardees. In point of fact, applicants and awardees are institutions who in turn designate PIs; PIs are typically employees of the applicants and awardees.

Results

Funding and Success Rates for RPG and R01 Applications and Applicants

For background context, Figure 1 shows the numbers of applicants, awardees, applications, and awards for *all* (not only Type 1) RPG awards. Since 2015 funding and success rates have improved. Of note, in FY2021 there was a marked increase numbers of applicants and awardees, possibly a pandemic effect. Numbers of applicants and awardees decreased in FY2022 with slight increases in funding and success rates. Figure 2 shows corresponding values for R01-Equivalent applications and applicants.

Race and Ethnicity Analyses

Figures 3 through 7 show the number of Type 1 RPG and R01-Equivalent applicants by race-ethnicity. In FY2022 the number of white applicants declined while the number of Black and Hispanic applicants continued to increase. Figure 8 shows funding rates. The gaps for Asian and Hispanic investigators have largely disappeared, while the gap for Black investigators persist, though not as marked as 3-4 years ago.

Table 1 shows characteristics according to race-ethnicity for scientists designated as Principal Investigators on at least one Type 1 RPG application in FY2022. Scientists with unknown race-ethnicity were much more likely to have a degree other than PhD, MD-PhD, or MD; were less likely to submit an R01-equivalent application; were less likely to be early-stage investigators; had submitted fewer

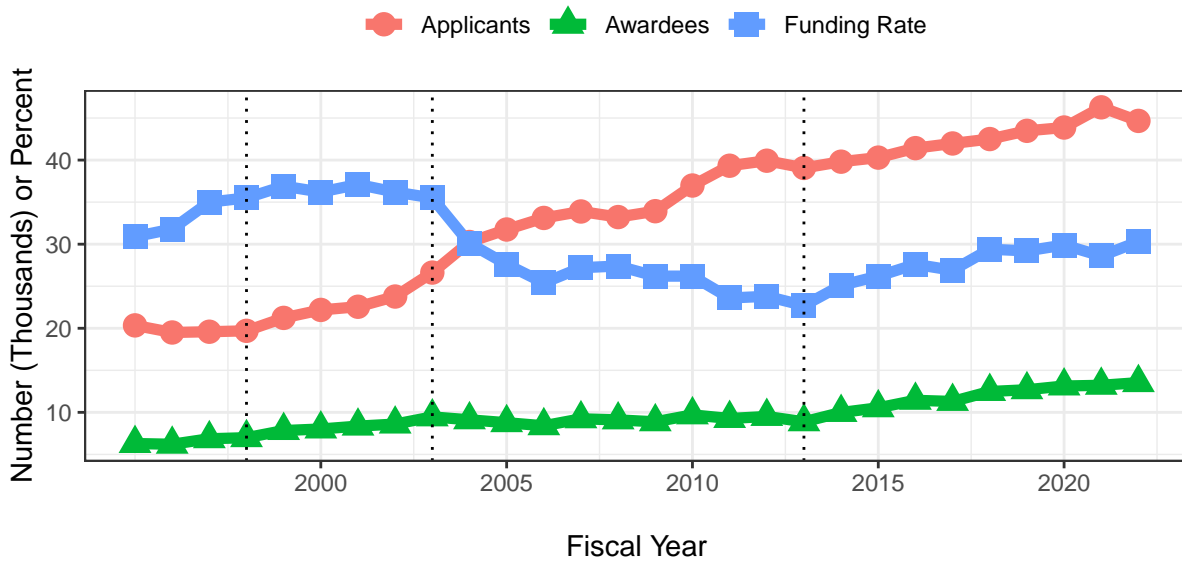
Type 1 RPG applications between FY2010 and FY2021; and were less likely to have submitted an application from an institution of higher education. Compared with white scientists, Black scientists were more likely to be women; less likely to have a PhD; more likely to have a degree other than PhD, MD-PhD, or MD; less likely to submit an R01 application; less likely to submit an animal application; more likely to submit a human application; more likely to be early-stage investigators; had submitted fewer Type 1 RPG applications between FY2010 and FY2021; and were less likely to have submitted an application from a research organization or an independent hospital.

Table 2 shows the results of logistic regression analyses for funding of at least one FY2022 Type 1 RPG application among scientists designated as Principal Investigators. Black scientists were less likely to be funded with the effect size decreasing by approximately 40% after adjusting for considered confounders. In the multivariable model, the strongest predictors of funding success were the number of applications submitted in FY2022, the number of Type 1 RPG awards between FY2010 and FY2021, and early-stage investigator status; the strongest predictors of funding failure were a larger number of applications submitted between FY2010 and FY2021 and a degree other than PhD, MD-PhD, or MD.

Summary

These analyses show slight improvements in funding and success rates in FY2022, partially due to a decline in the number of applicants and applications. Race-ethnicity gaps have narrowed over the past few years, though a white-Black gap, while narrower than before, persists and actually increased in FY2022 compared with FY2021. Additionally, although there are increased numbers of Black and Hispanic applicants, the total numbers remain quite small.

A: RPG Funding Rates



B: RPG Success Rates

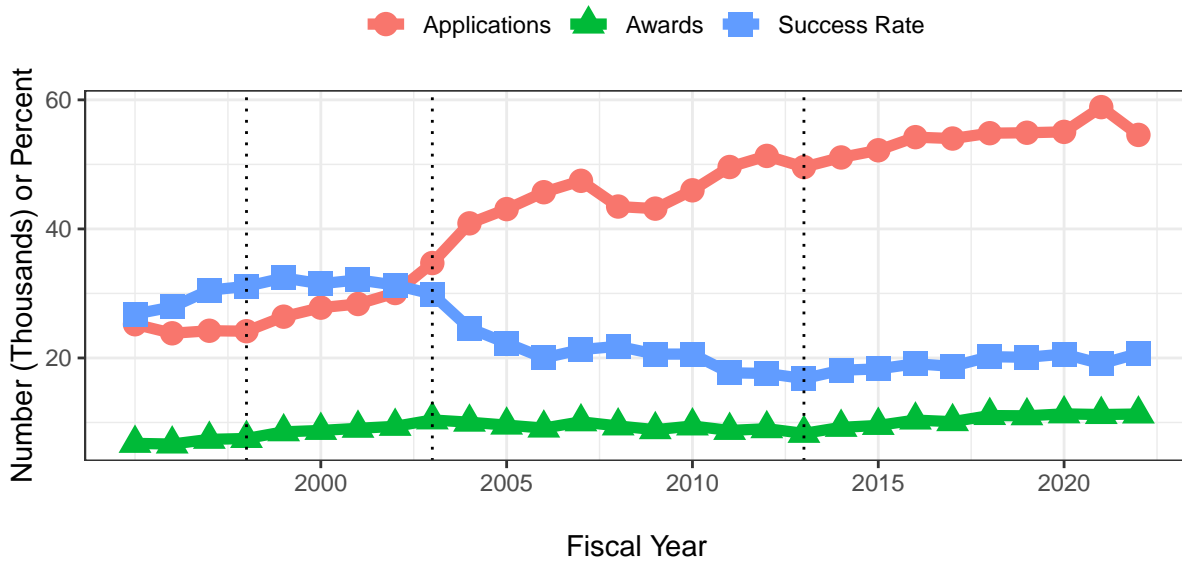
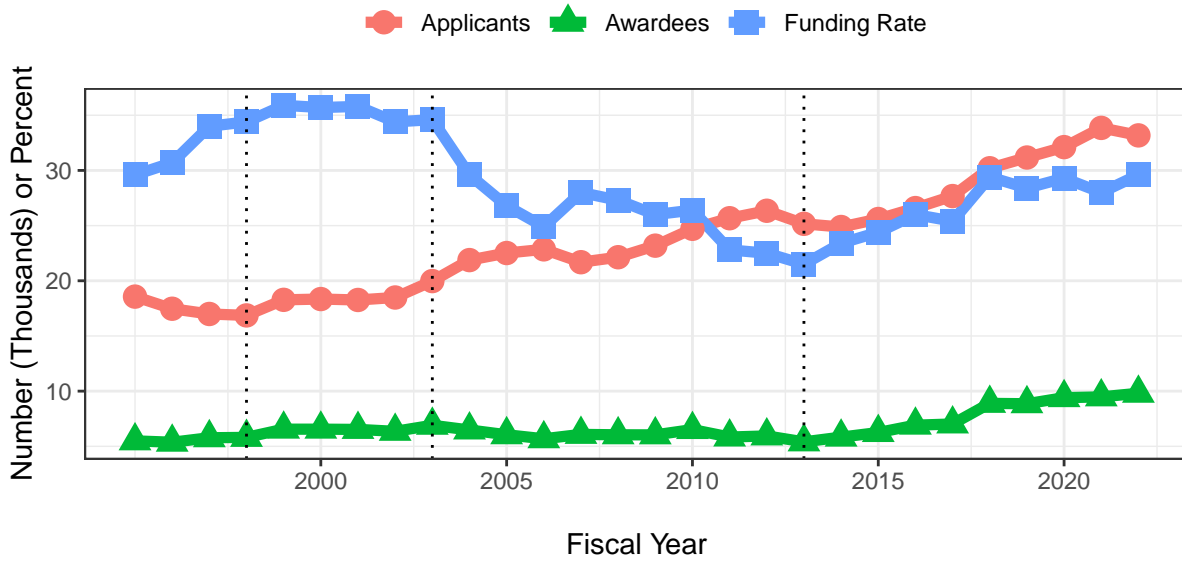


Figure 1: NIH RPG funding (panel A) and success (panel B) rates by fiscal year. The vertical lines depict the beginning (1998) and end (2003) of the NIH doubling and the year (2013) of budget sequestration.

A: R01-Equivalent Funding Rates



B: R01-Equivalent Success Rates

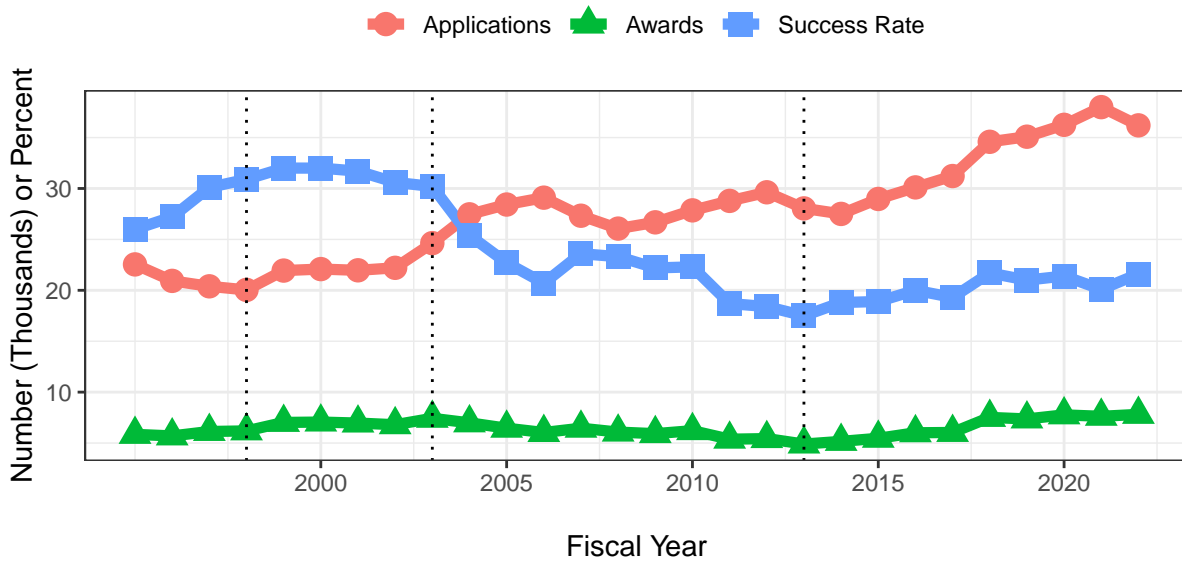
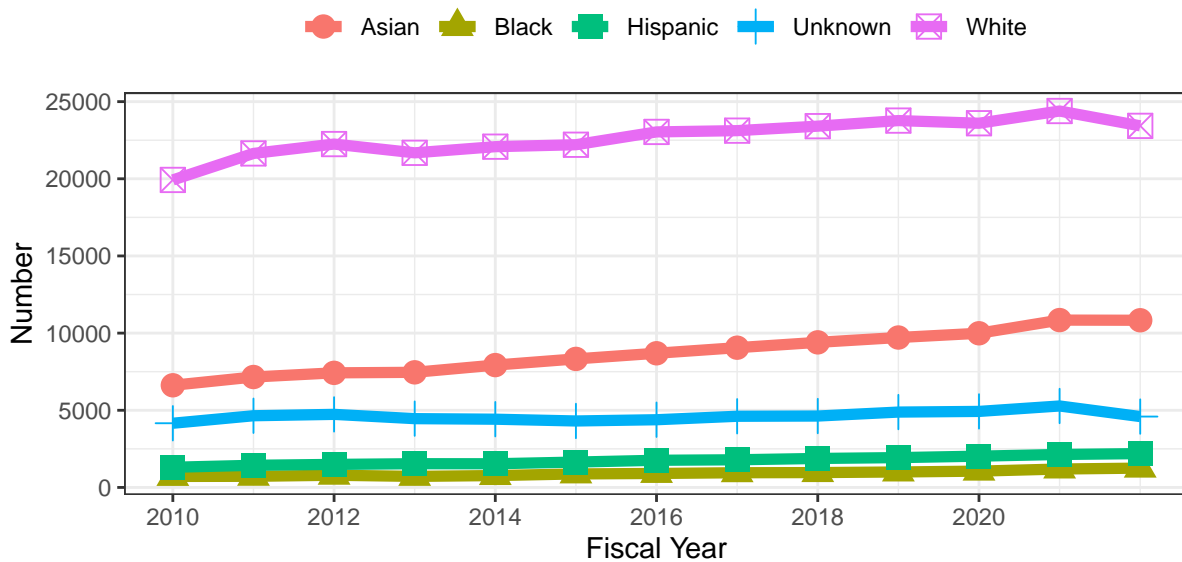


Figure 2: NIH R01-Equivalent funding (panel A) and success (panel B) rates by fiscal year. The vertical lines depict the beginning (1998) and end (2003) of the NIH doubling and the year (2013) of budget sequestration.

A: Type 1 RPG Applicants



A: Type 1 R01-Equivalent Applicants

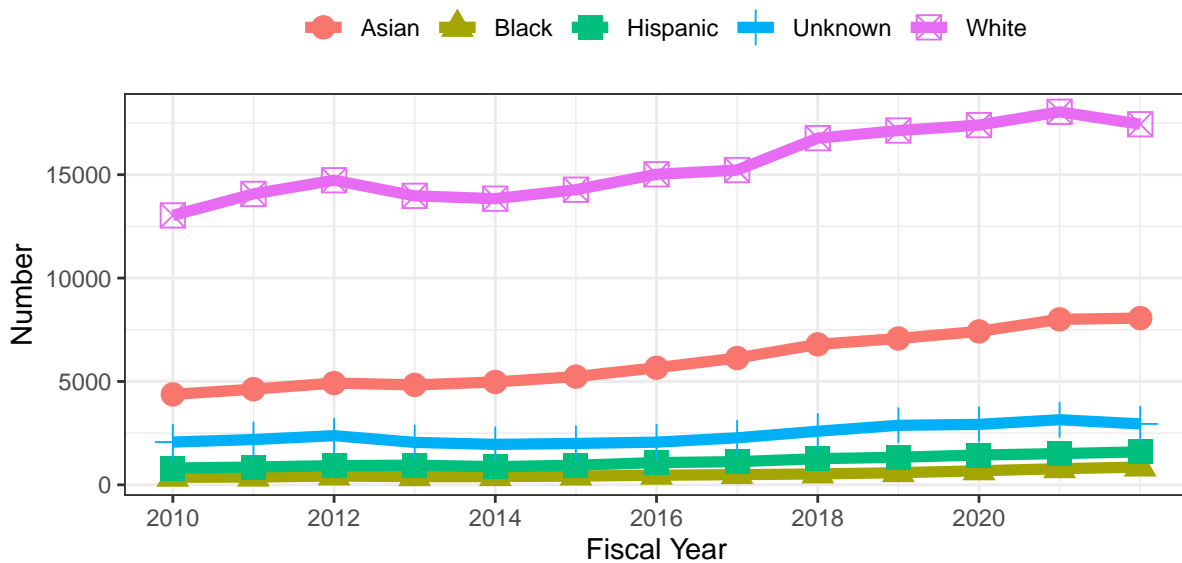
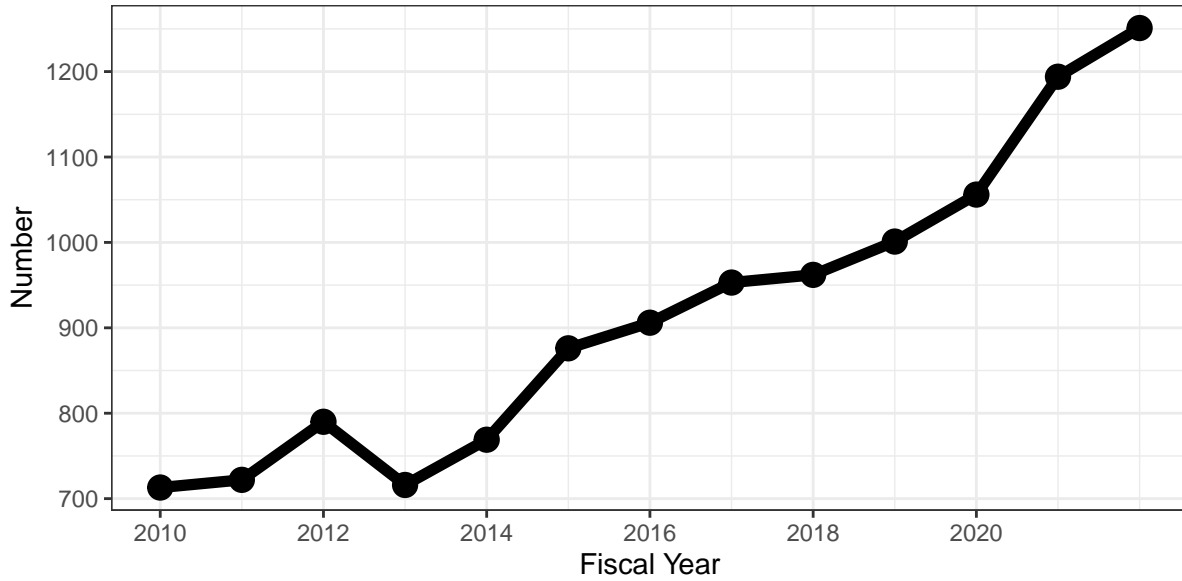


Figure 3: Number of PI applicants by race-ethnicity for Type 1 RPG (Panel A) and Type 1 R01-Equivalent (Panel B) awards by fiscal year.

A: Number of Unique Type 1 RPG Black Applicants



B: Number of Unique Type 1 RPG Black Awardees

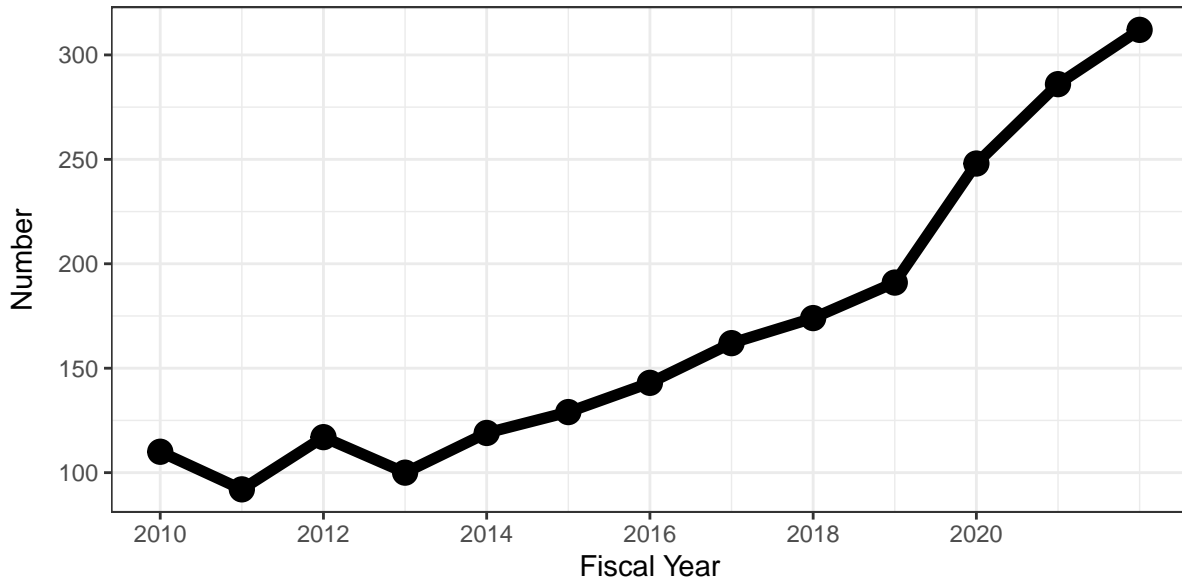
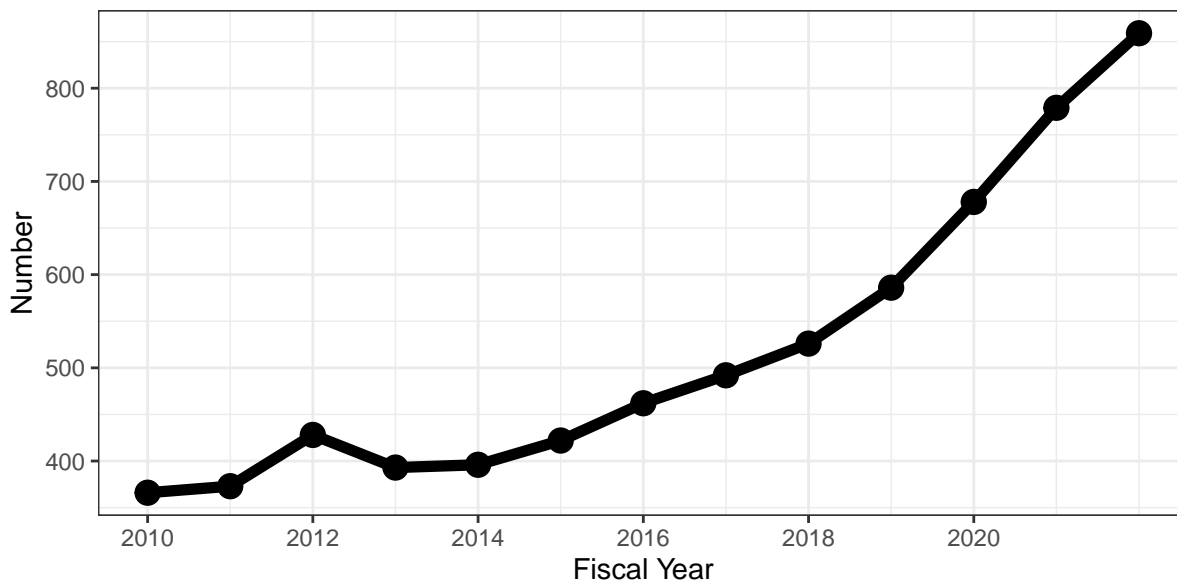


Figure 4: Number of Black PI Type 1 RPG applicants (Panel A) and awardees (Panel B) by fiscal year.

A: Number of Unique Type 1 R01–Equivalent Black Applicants



B: Number of Unique Type 1 R01–Equivalent Black Awardees

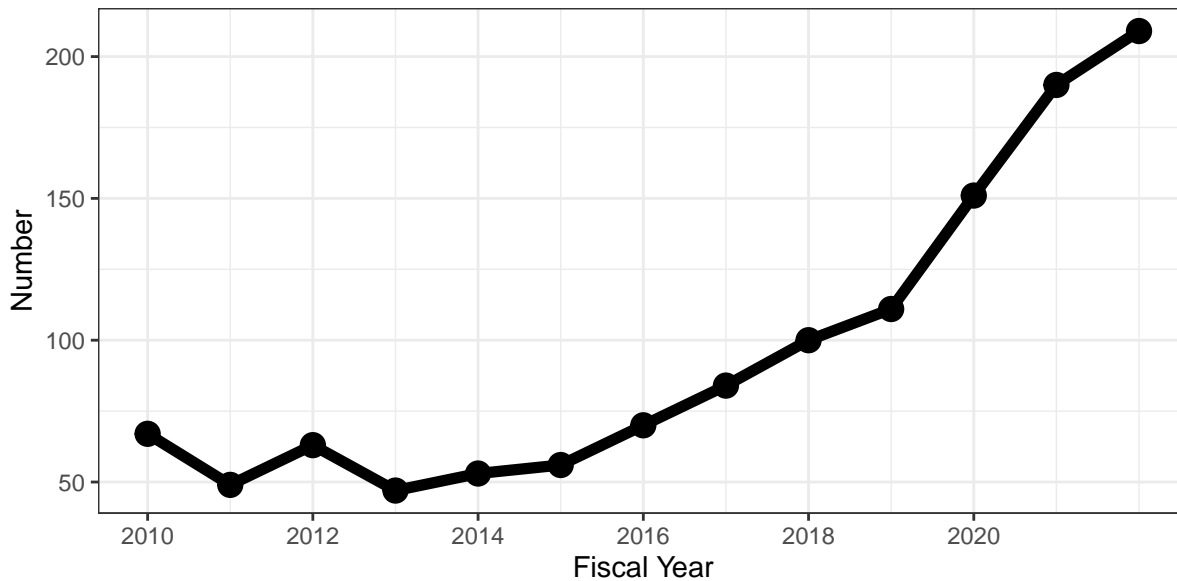
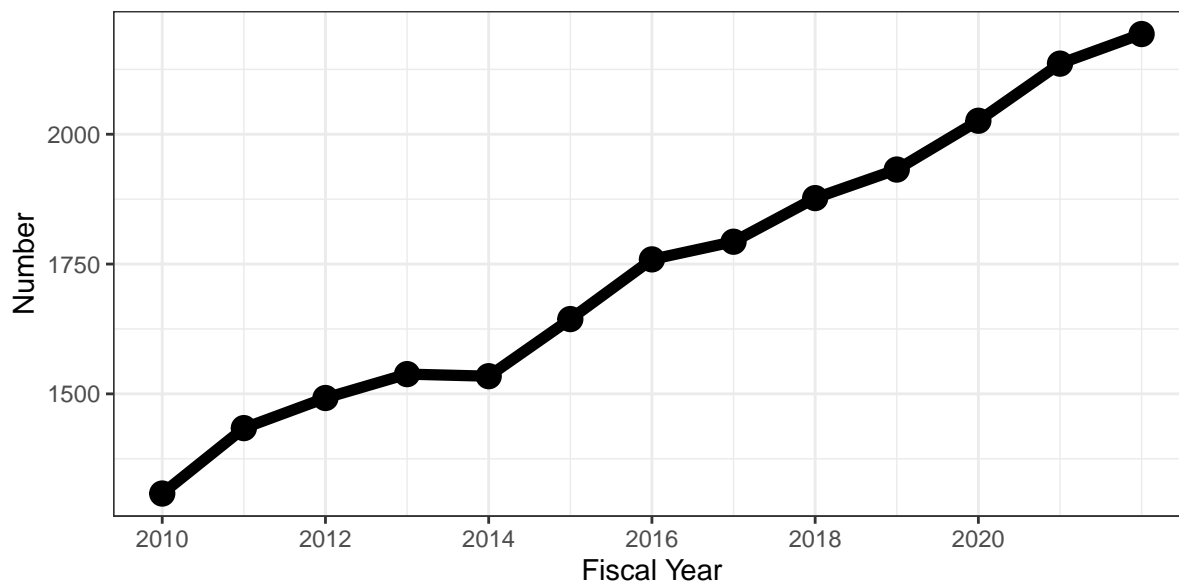


Figure 5: Number of Black PI Type 1 R01-Equivalent applicants (Panel A) and awardees (Panel B) by fiscal year.

A: Number of Unique Type 1 RPG Hispanic Applicants



B: Number of Unique Type 1 RPG Hispanic Awardees

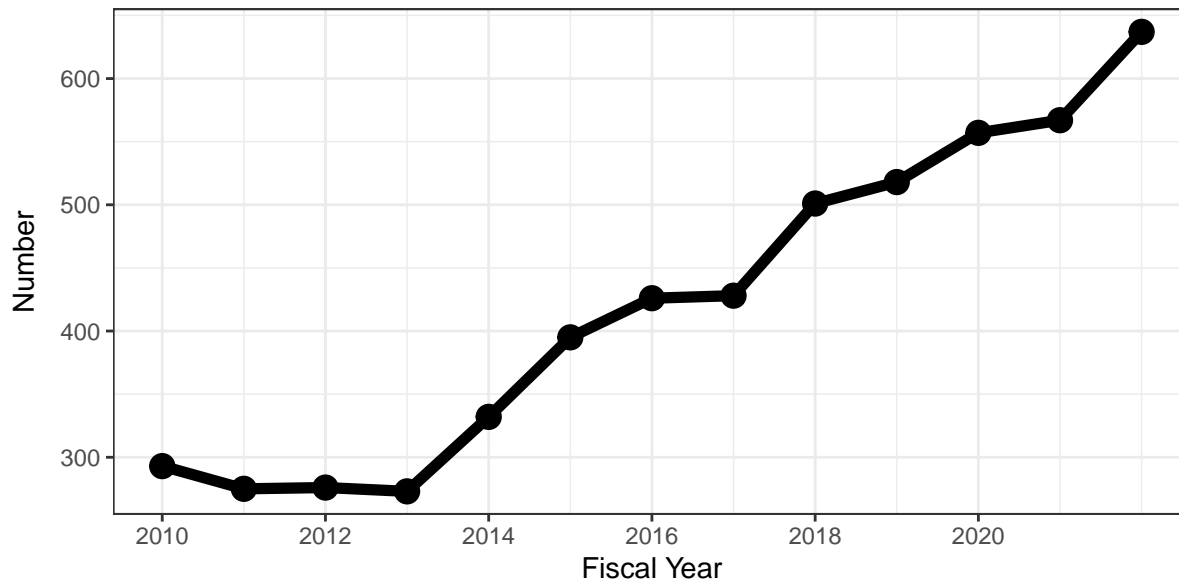


Figure 6: Number of Hispanic PI Type 1 RPG applicants (Panel A) and awardees (Panel B) by fiscal year.

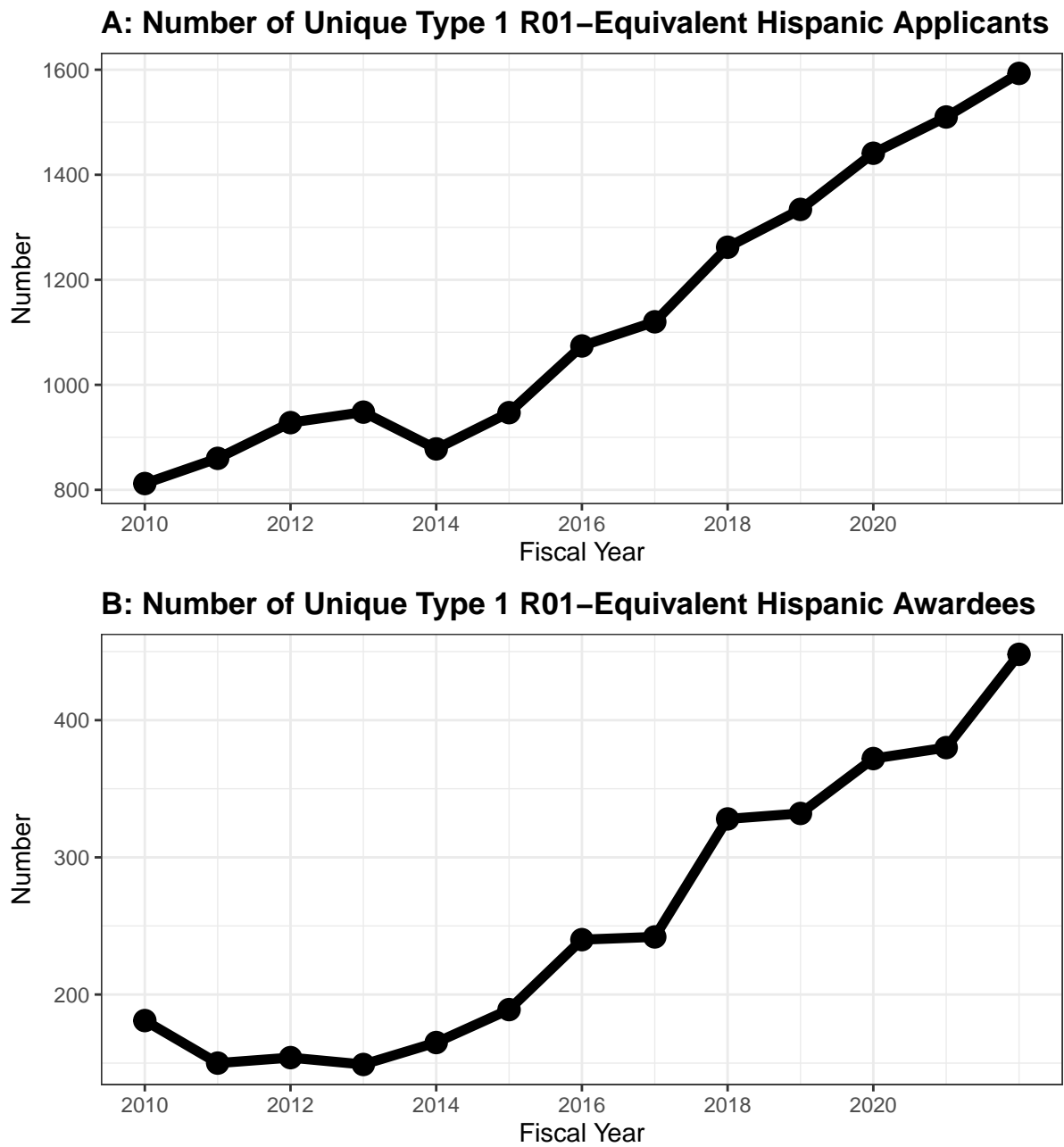
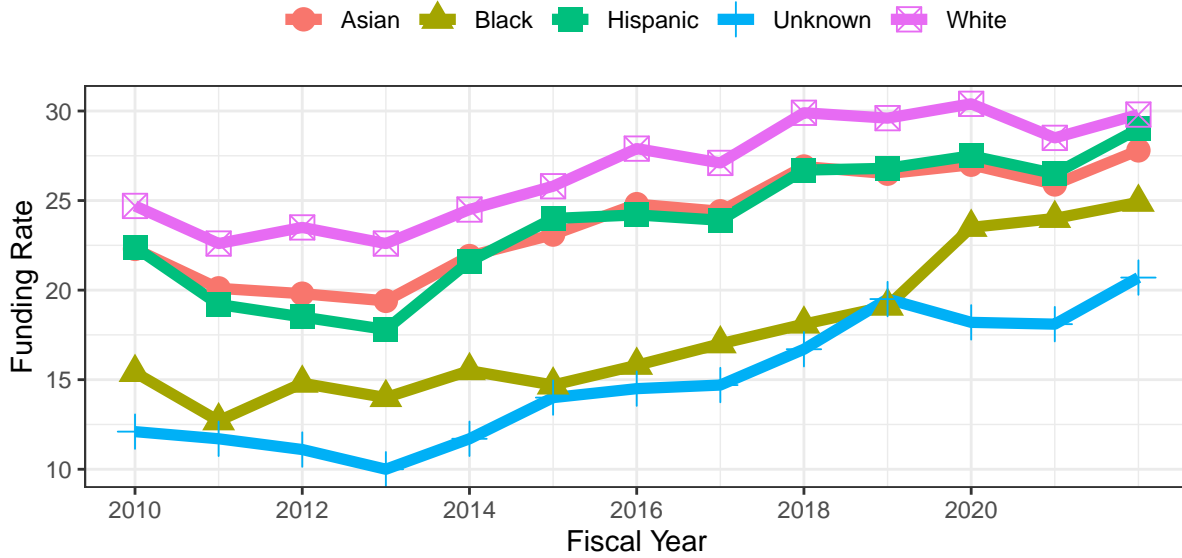


Figure 7: Number of Hispanic PI Type 1 R01-Equivalent applicants (Panel A) and awardees (Panel B) by fiscal year.

A: Funding Rates Type 1 RPG Applicants



B: Funding Rates Type 1 R01-Equivalent Applicants

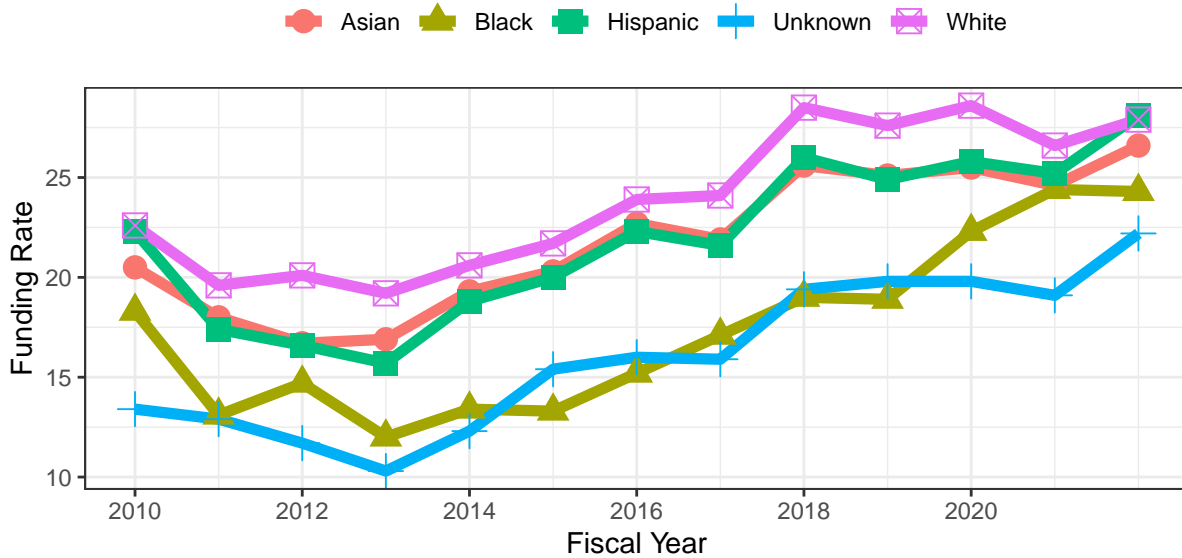


Figure 8: Funding rates for Type 1 RPG (Panel A) and Type 1 R01-Equivalent (Panel B) applicants by fiscal year according to race-ethnicity.

Table 1: Characteristics of scientists who were designated as a Principal Investigator on at least one Type 1 FY2022 application. The numbers of prior Type 1 RPG applications and awards refers to the period of FY2010 to FY2021.

Characteristic		White	Asian	Unknown	Hispanic	Black
Total N (%)		23430 (55.4)	10833 (25.6)	4592 (10.9)	2193 (5.2)	1251 (3.0)
Sex	Male	14010 (59.8)	7206 (66.5)	1495 (32.6)	1254 (57.2)	637 (50.9)
	Female	9151 (39.1)	3466 (32.0)	687 (15.0)	908 (41.4)	586 (46.8)
	Unknown	269 (1.1)	161 (1.5)	2410 (52.5)	31 (1.4)	28 (2.2)
Degree	PhD	16853 (71.9)	7760 (71.6)	1862 (40.5)	1524 (69.5)	810 (64.7)
	MD	3493 (14.9)	1260 (11.6)	410 (8.9)	309 (14.1)	218 (17.4)
	MD-PhD	2102 (9.0)	1375 (12.7)	234 (5.1)	208 (9.5)	111 (8.9)
	Other	982 (4.2)	438 (4.0)	2086 (45.4)	152 (6.9)	112 (9.0)
Submitted an R01-Equivalent Application		17441 (74.4)	8064 (74.4)	2946 (64.2)	1593 (72.6)	859 (68.7)
Submitted an R21 or R03 Application		7492 (32.0)	4087 (37.7)	1633 (35.6)	746 (34.0)	441 (35.3)
Submitted an Animal Application		10675 (45.6)	6270 (57.9)	1738 (37.8)	1041 (47.5)	366 (29.3)
Submitted a Human Application		12280 (52.4)	4466 (41.2)	2450 (53.4)	1134 (51.7)	872 (69.7)
Early-Stage Investigator		4369 (18.6)	2141 (19.8)	567 (12.3)	488 (22.3)	357 (28.5)
Number Prior Type 1 RPG Applications	Mean (SD)	8.51 (8.82)	9.84 (10.73)	4.89 (8.12)	7.44 (8.43)	6.13 (7.93)
Number Prior Type 1 RPG Awards	Mean (SD)	1.68 (2.08)	1.56 (2.01)	0.78 (1.58)	1.32 (1.82)	0.87 (1.45)
Number of FY22 Applications	Mean (SD)	1.61 (1.04)	1.85 (1.39)	1.45 (1.04)	1.58 (1.07)	1.56 (1.09)
Submitted from Institution of Higher Education		19594 (83.6)	9211 (85.0)	3594 (78.3)	1865 (85.0)	1097 (87.7)
Submitted from Research Organization		1543 (6.6)	602 (5.6)	353 (7.7)	124 (5.7)	49 (3.9)
Submitted from Independent Hospital		2145 (9.2)	892 (8.2)	371 (8.1)	152 (6.9)	67 (5.4)
Funded as Principal Investigator		6981 (29.8)	3007 (27.8)	951 (20.7)	637 (29.0)	312 (24.9)

Table 2: Logistic regression models for funding of at least one FY2022 Type 1 RPG application among scientists designated as Principal Investigators. The numbers of prior Type 1 RPG applications and awards refers to the period of FY2010 to FY2021. Model 1 focuses on race only, while Model 2 focuses on sex only. Values shown are regression coefficients (standard errors). A value greater than zero implies a higher likelihood of funding, while a value less than zero implies a lower likelihood.

	<i>Dependent variable:</i>		
	Funded as Principal Investigator		
	(1)	(2)	(3)
Asian (vs White)	-0.099*** (0.026)		-0.136*** (0.027)
Race Unknown (vs White)	-0.485*** (0.039)		-0.109* (0.049)
Hispanic (vs White)	-0.036 (0.049)		0.026 (0.051)
Black (vs White)	-0.245*** (0.067)		-0.143* (0.069)
Female (vs Male)		0.028 (0.023)	0.097*** (0.025)
Sex Unknown (vs Male)		-0.722*** (0.052)	-0.052 (0.070)
MD (vs PhD)			0.028 (0.034)
MD-PhD (vs PhD)			0.027 (0.039)
Other degree (vs PhD)			-0.541*** (0.060)
Submitted R01 Equivalent			0.085* (0.035)
Submitted R21 or R03			-0.109*** (0.031)
Submitted Animal Application			-0.104*** (0.027)
Submitted Human Application			-0.054* (0.027)
Early-Stage Investigator			0.229*** (0.032)
Number Prior Type 1 RPG Applications			-0.037*** (0.002)
Number Prior Type 1 RPG Awards			0.221*** (0.008)
Number FY22 Applications			0.454*** (0.013)
Submitted from Institution of Higher Education			0.253*** (0.050)
Submitted from Research Organization			0.153* (0.060)
Submitted from Hospital			0.311*** (0.056)
Constant	-0.857*** (0.014)	-0.907*** (0.014)	-1.954*** (0.060)
Observations	42,299	42,299	42,299
Log Likelihood	-25,036.590	-25,005.350	-23,443.430
Akaike Inf. Crit.	50,083.180	50,016.710	46,928.860

Note:

*p<0.05; **p<0.01; ***p<0.001