

# 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, R16, R21, R22, R23, R29, R33, R34, R35, R36, R37, R61, R50, R55, R56, 'R61', 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 decreased in FY2022 and the awardee count increased with slight increases in funding and success rates. In FY2023, number of both applicants and awardees decreased with increases in funding and success rates. Figure 2 shows corresponding values for R01-Equivalent applications and applicants.

### Race-Ethnicity and Gender Analyses

Figures 3 through 7 show the number of Type 1 RPG and R01-Equivalent applicants by race-ethnicity. The number of white applicants declined while the number of Black and Hispanic applicants continued to increase in FY2023. 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 5-6 years ago. Figure 9 shows funding rates according to gender; in recent years men and women have had similar funding rates. Figures 11 and 12 show, after a K award, men are applying for and receiving R01-equivalent grants at a greater rate.

Table 1 shows characteristics according to race-ethnicity for scientists designated as Principal Investigators on at least one Type 1 RPG application in FY2023. 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 FY2022; 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 FY2022; and were less likely to have submitted an application from a research organization or an independent hospital.

Table 2 shows characteristics according to gender for scientists designated as Principal Investigators on at least one Type 1 RPG application in FY2023. Women were more likely to be early-stage investigators and to submit at least one human-research application; they were less likely to submit animal-research applications.

Table 3 shows the results of logistic regression analyses for funding of at least one FY2023 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 32% after adjusting for considered confounders. In the multivariable model, the strongest predictors of funding success were the number of applications submitted in FY2023, and early-stage investigator status; the strongest predictors of funding failure were sex other than male and female, and a degree other than PhD, MD-PhD, or MD.

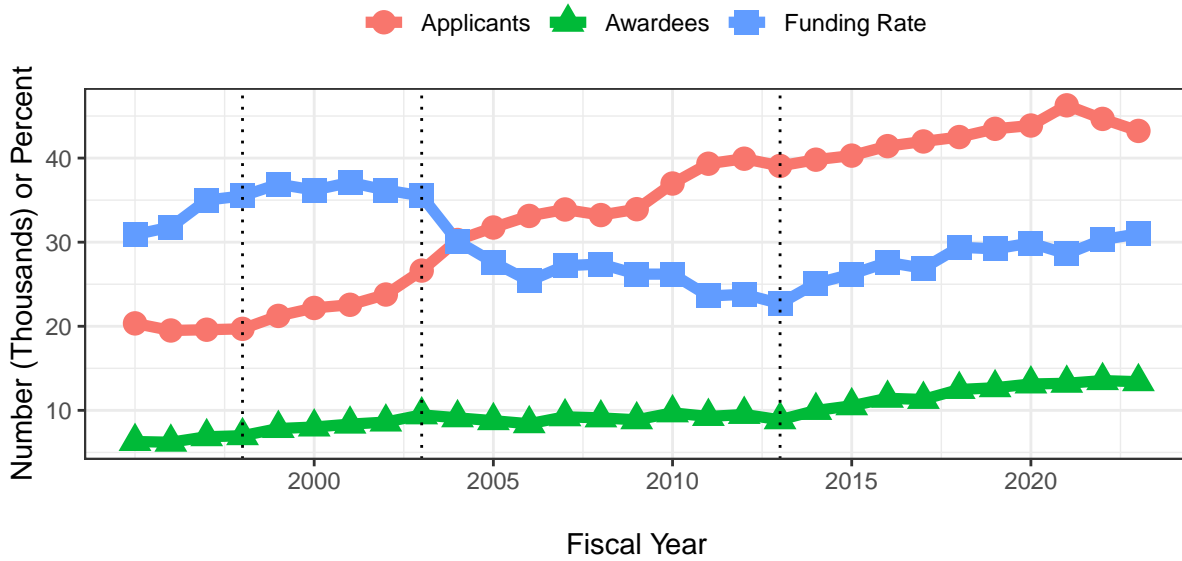
## Summary

These analyses show slight improvements in funding and success rates in FY2023, 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 FY2023 compared with FY2022. Additionally, although there are increased numbers of Black and Hispanic applicants, the total numbers remain quite small.

## Supplementary Type 2 analyses

Previous literature has suggested that women are less successful securing funding for Type 2 applications. Figure 10 shows Type 2 funding rates according to gender; in recent years, women have similar funding rates as men. In logistic regression analyses, there were no associations between gender or other demographic characteristics with funding rates (Tables 4 and 5)

### A: RPG Funding Rates



### B: RPG Success Rates

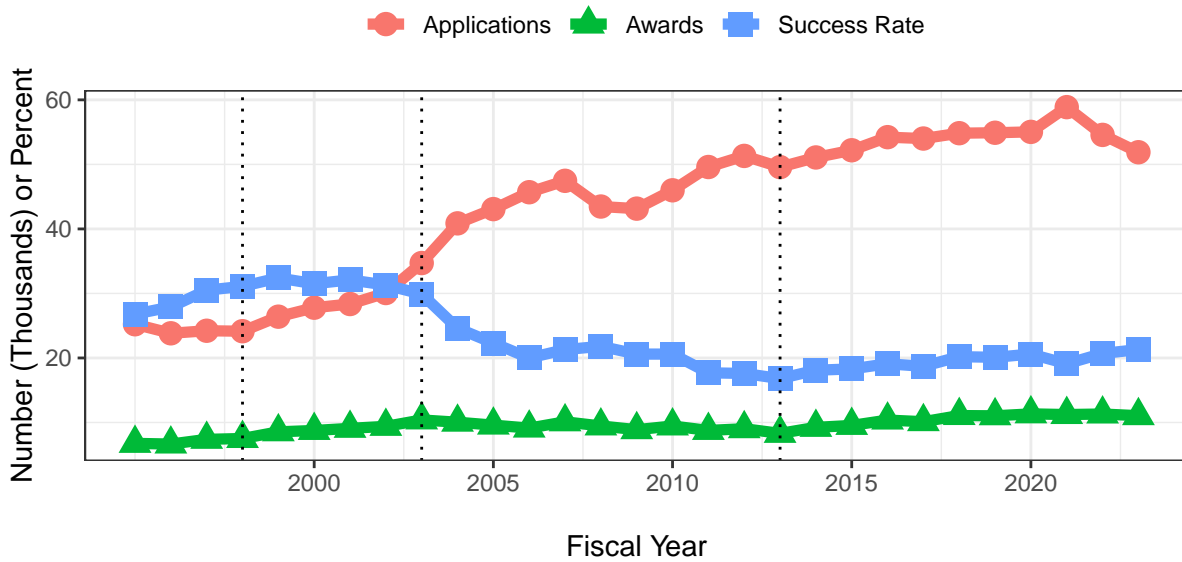
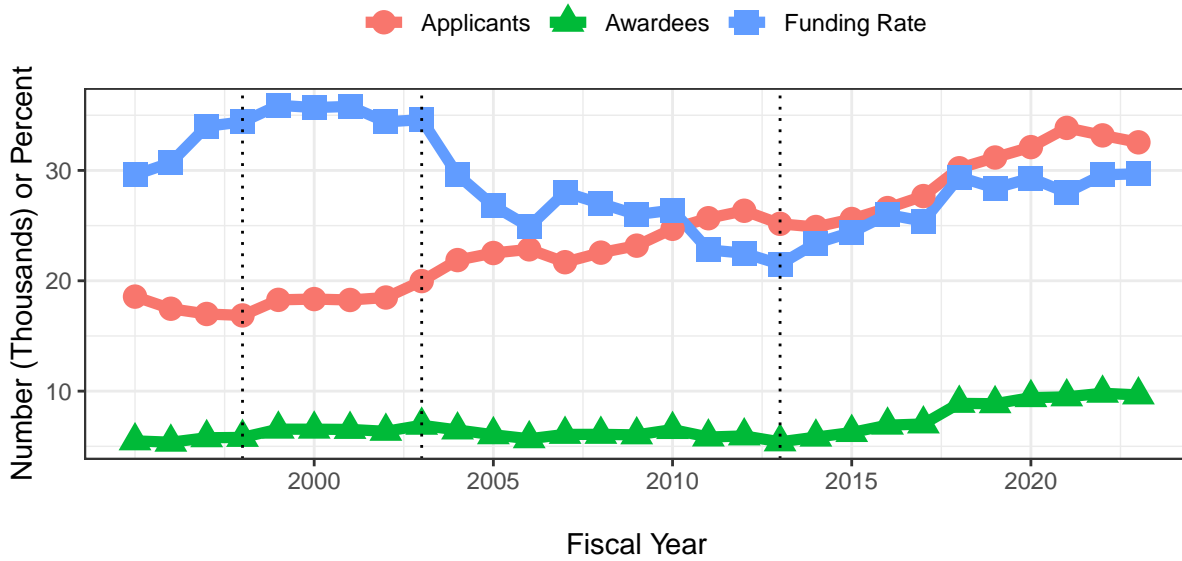


Figure 1: NIH RPG funding (panel A) and success (panel B) rates by fiscal year. The vertical lines depict the beginning (1998) and end (2003) of the NIH doubling and the year (2013) of budget sequestration.

### A: R01-Equivalent Funding Rates



### B: R01-Equivalent Success Rates

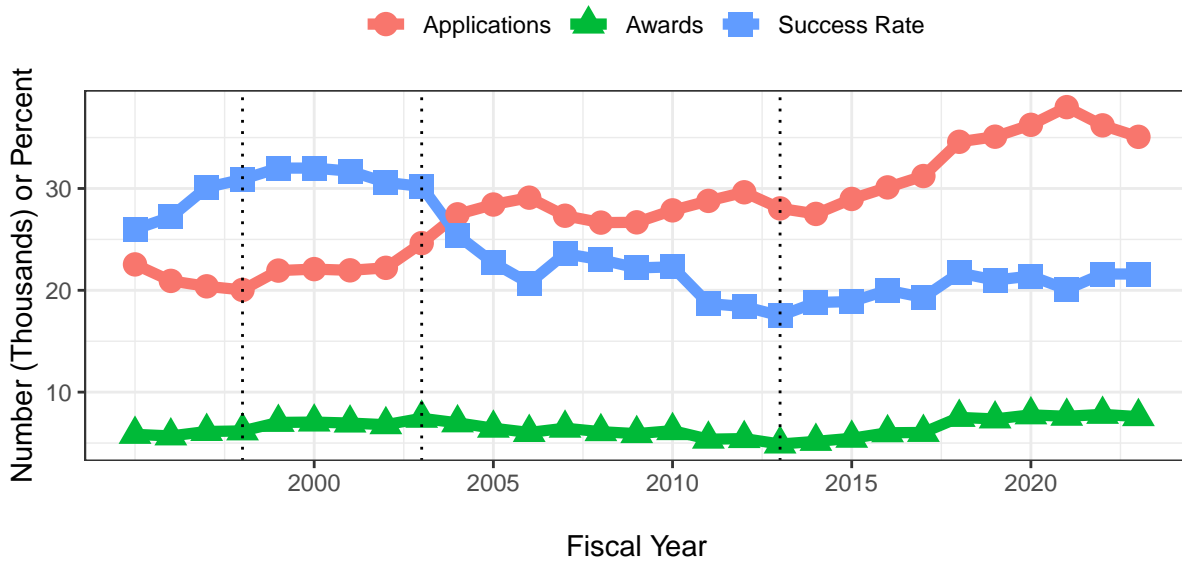


Figure 2: NIH R01-Equivalent funding (panel A) and success (panel B) rates by fiscal year. The vertical lines depict the beginning (1998) and end (2003) of the NIH doubling and the year (2013) of budget sequestration.

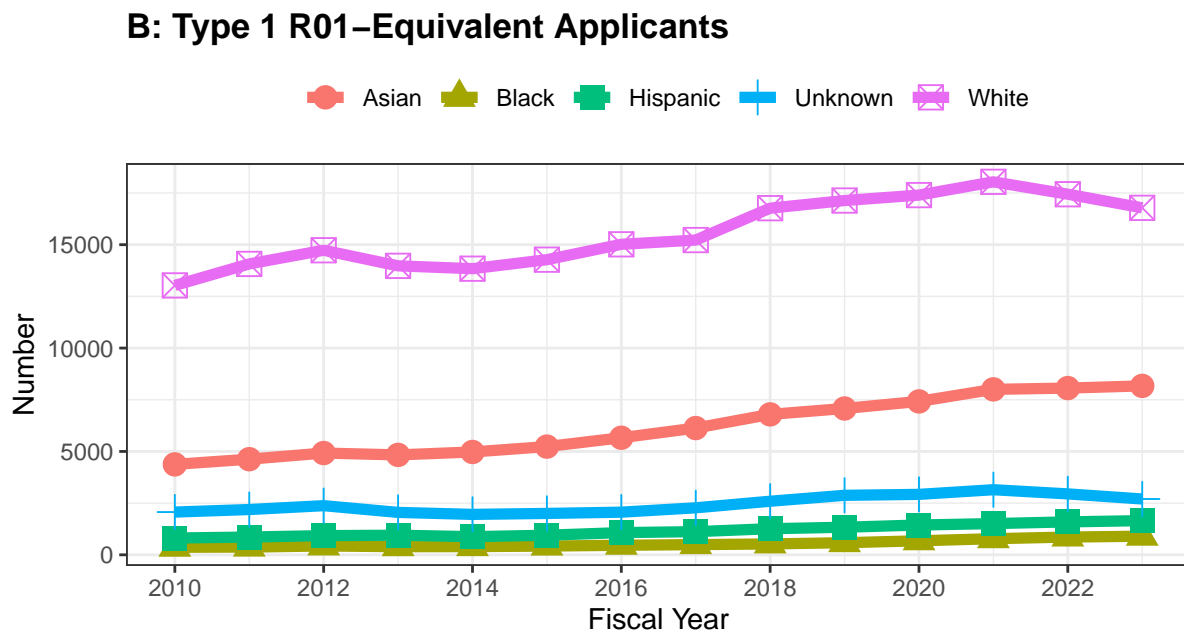
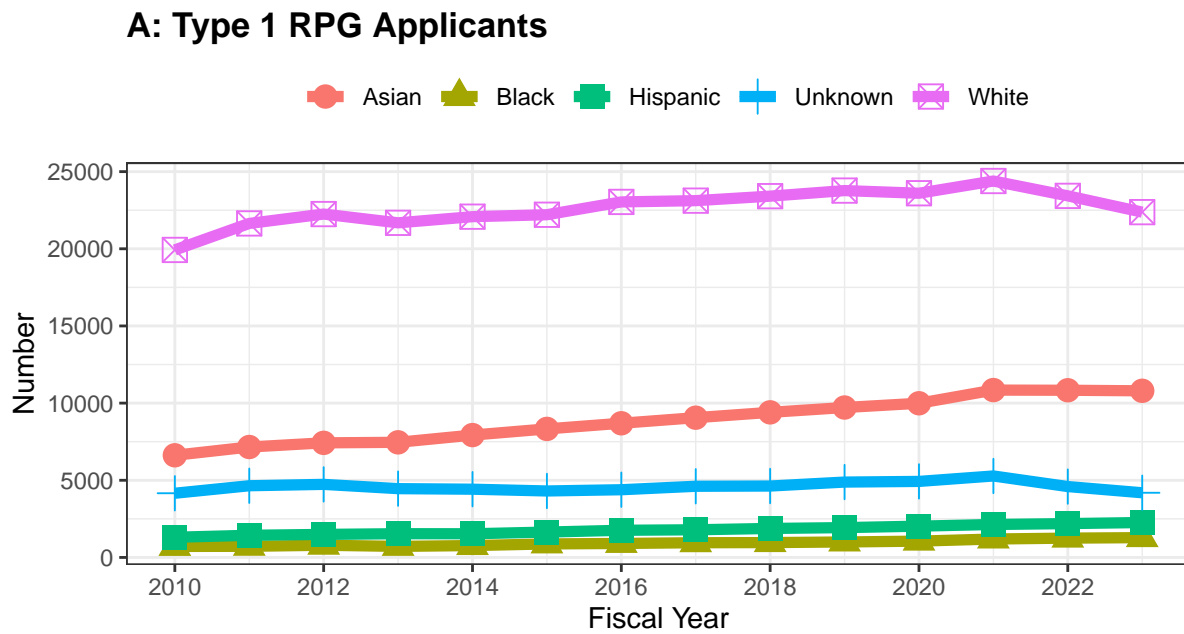


Figure 3: Number of PI applicants by race-ethnicity for Type 1 RPG (Panel A) and Type 1 R01-Equivalent (Panel B) awards by fiscal year.

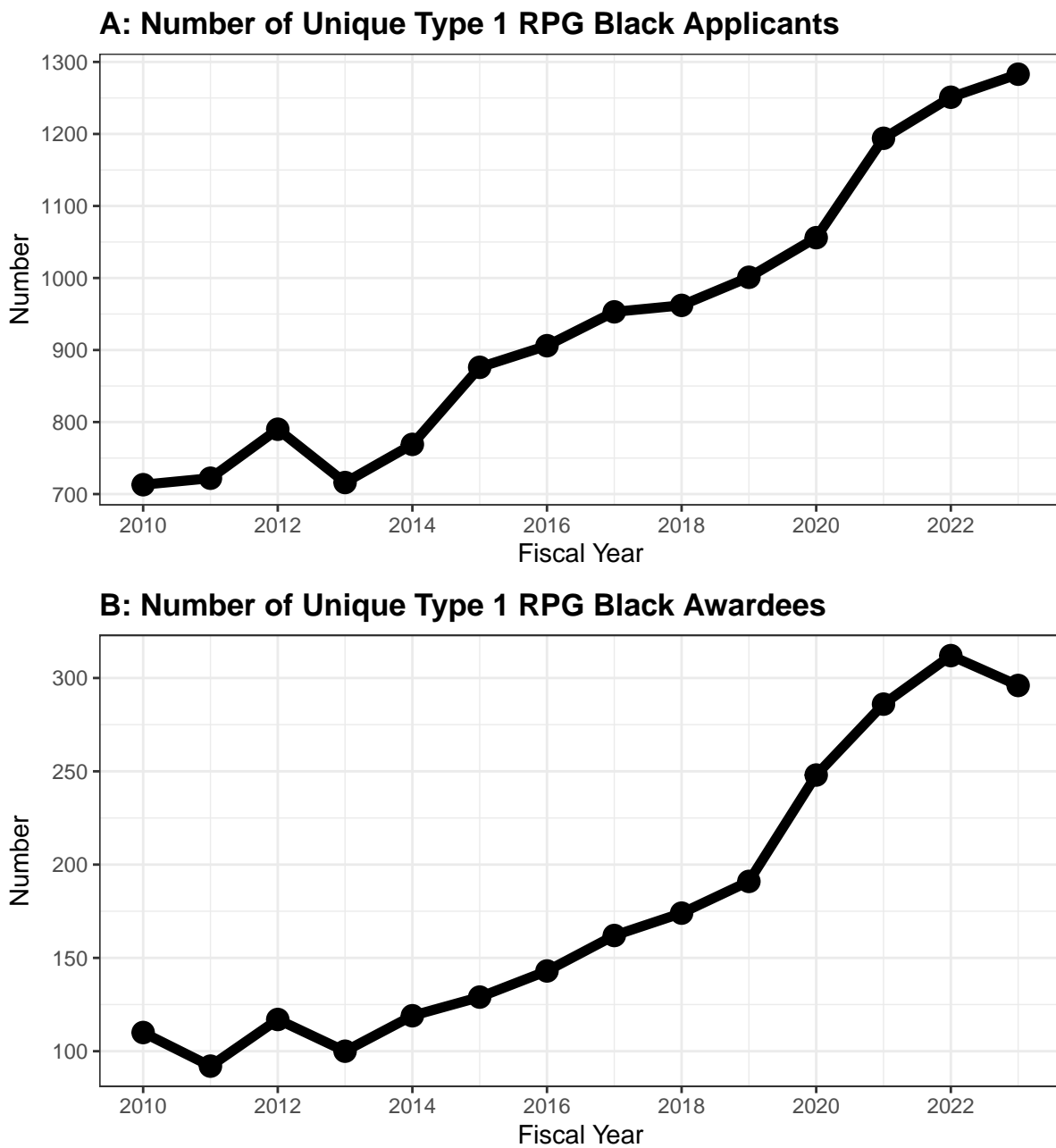
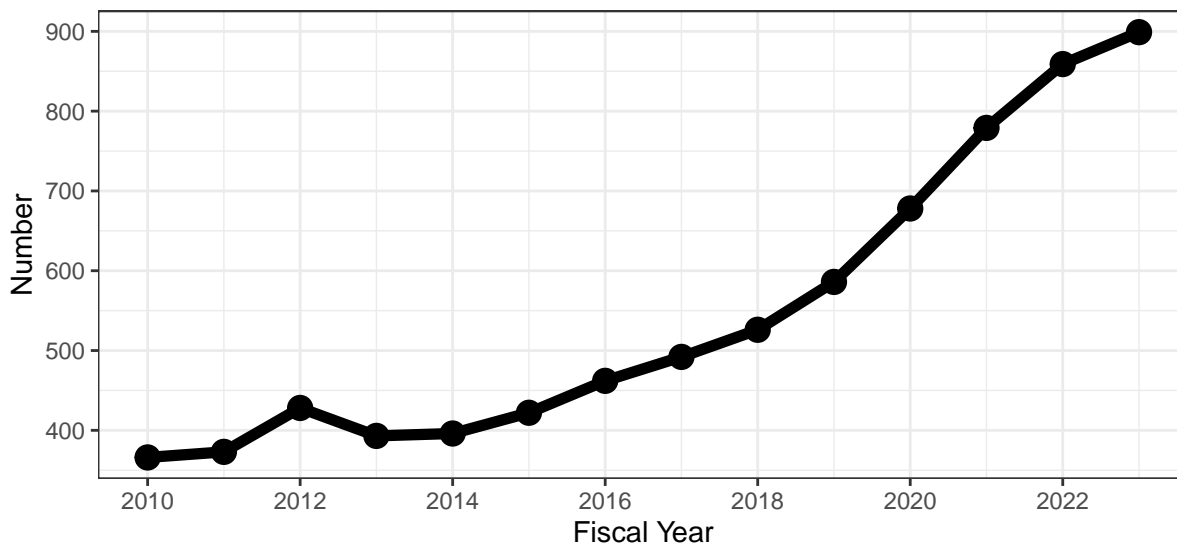


Figure 4: Number of Black PI Type 1 RPG applicants (Panel A) and awardees (Panel B) by fiscal year.

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



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

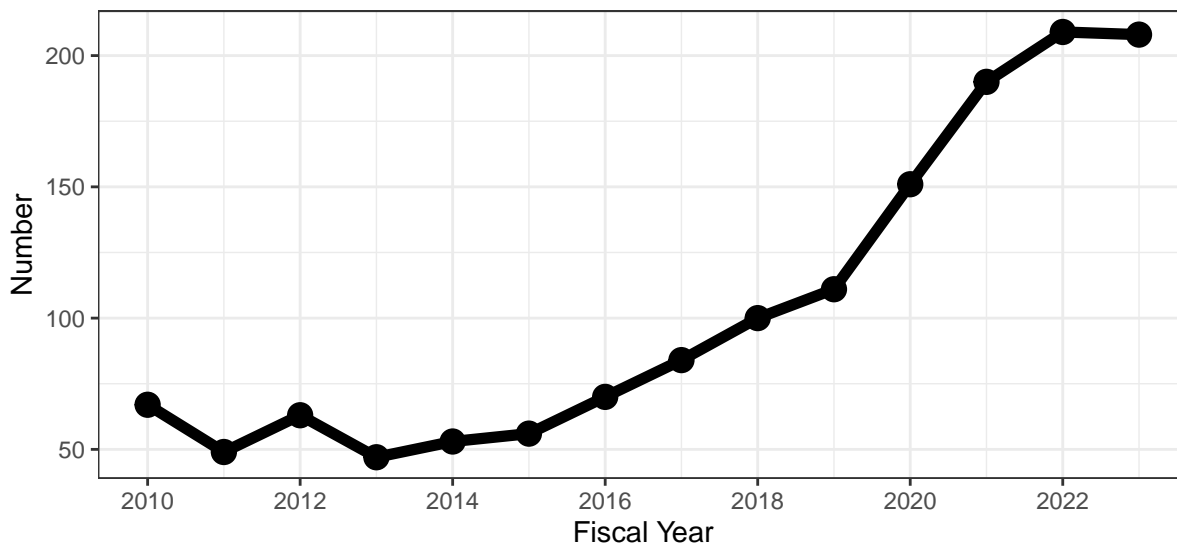
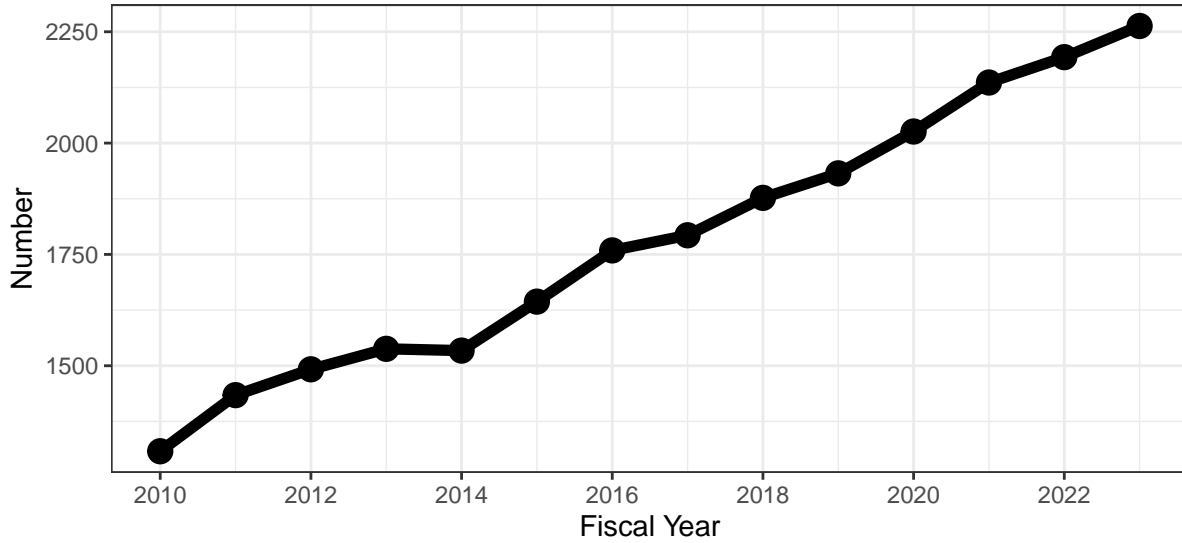


Figure 5: Number of Black PI Type 1 R01-Equivalent applicants (Panel A) and awardees (Panel B) by fiscal year.



**A: Number of Unique Type 1 RPG Hispanic Applicants**



**B: Number of Unique Type 1 RPG Hispanic Awardees**

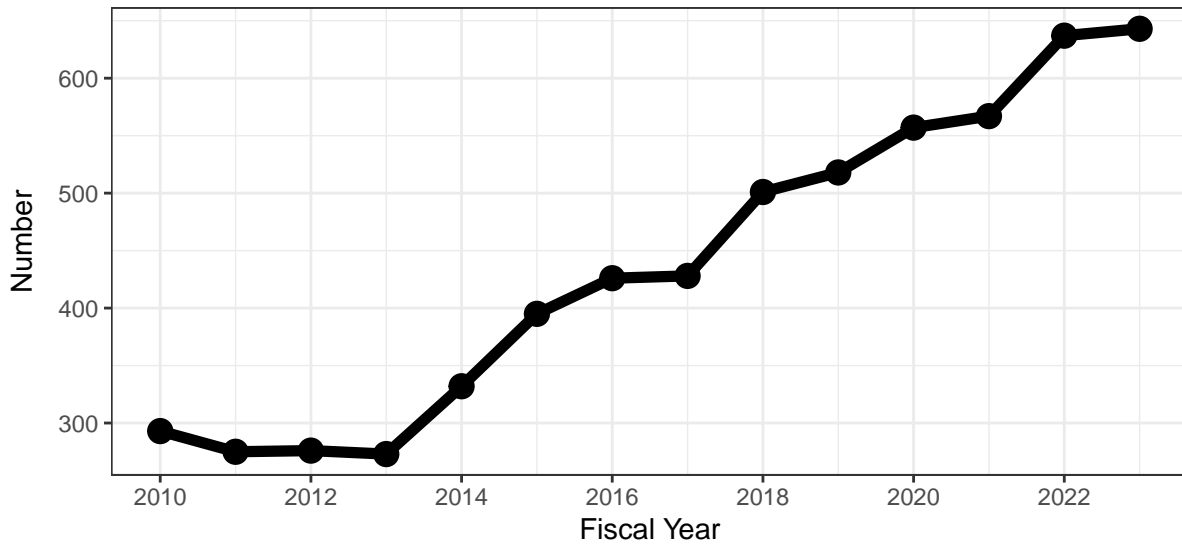
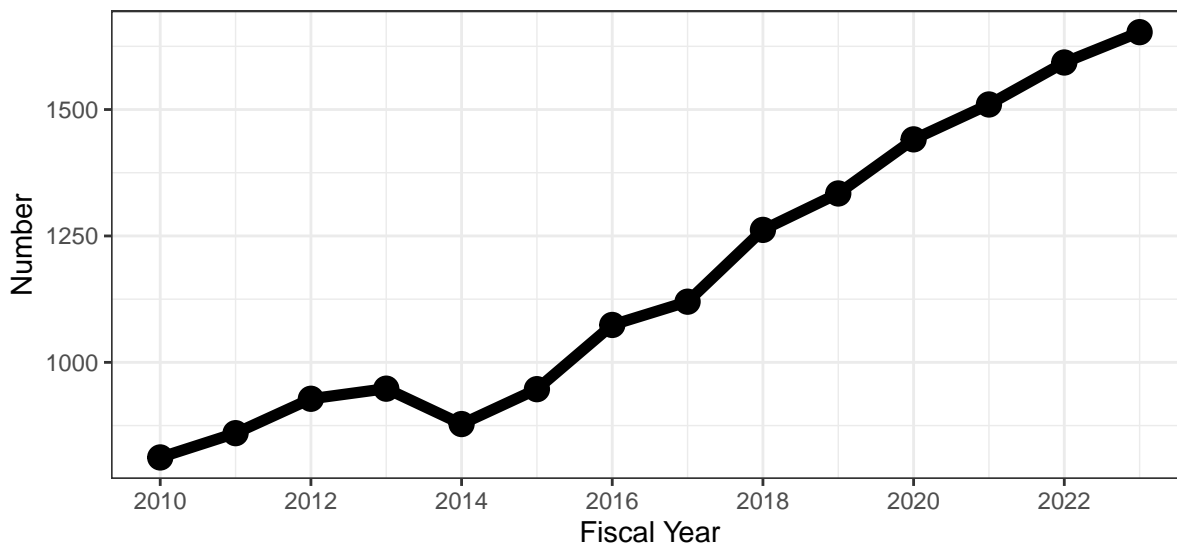


Figure 6: Number of Hispanic PI Type 1 RPG applicants (Panel A) and awardees (Panel B) by fiscal year.

**A: Number of Unique Type 1 R01-Equivalent Hispanic Applicants**



**B: Number of Unique Type 1 R01-Equivalent Hispanic Awardees**

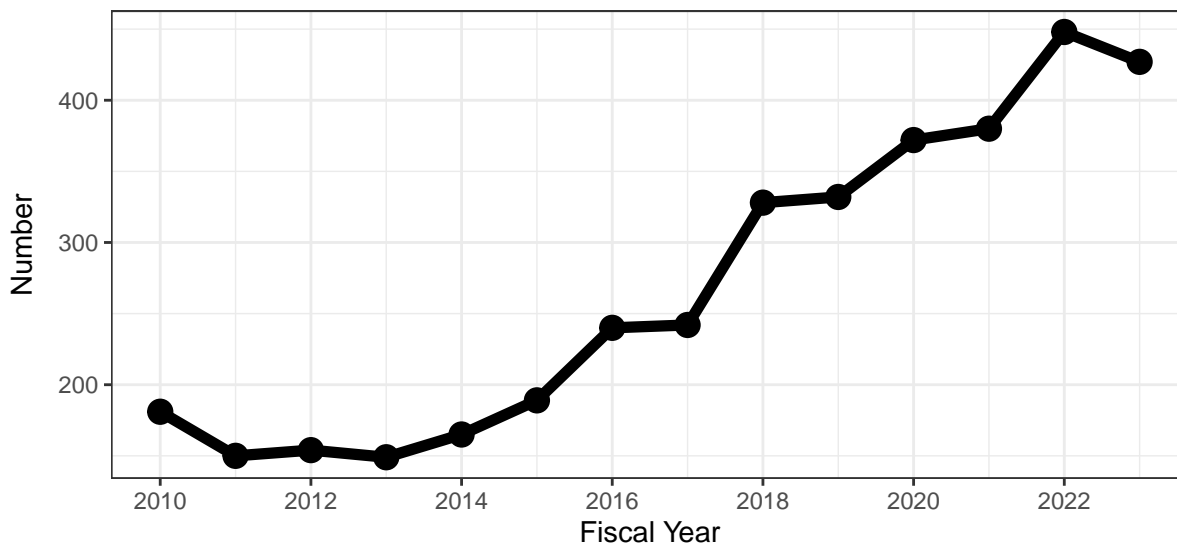
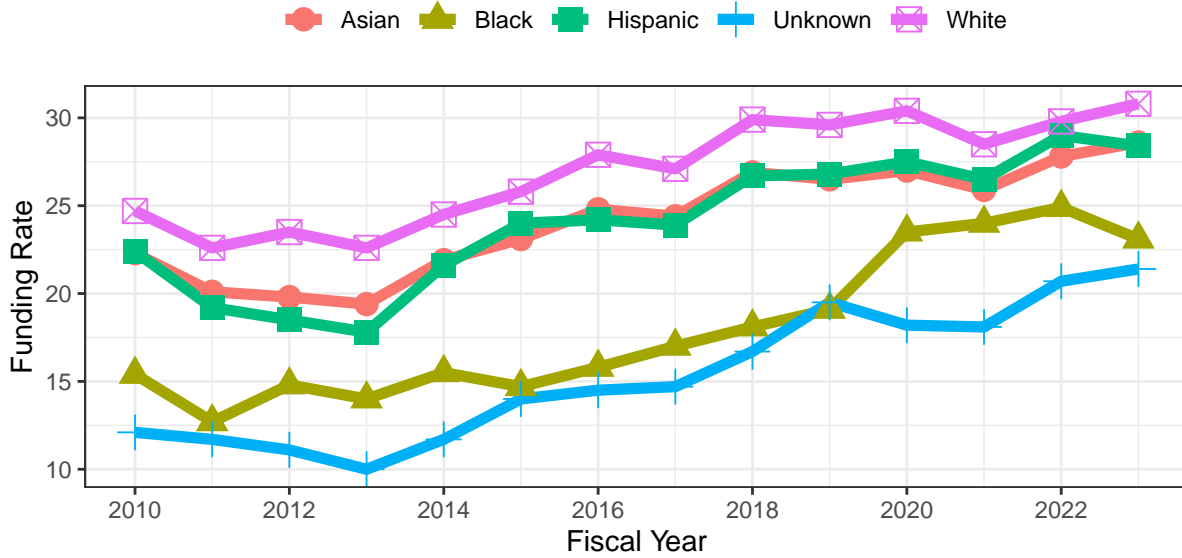


Figure 7: Number of Hispanic PI Type 1 R01-Equivalent applicants (Panel A) and awardees (Panel B) by fiscal year.

### A: Funding Rates Type 1 RPG Applicants



### B: Funding Rates Type 1 R01-Equivalent Applicants

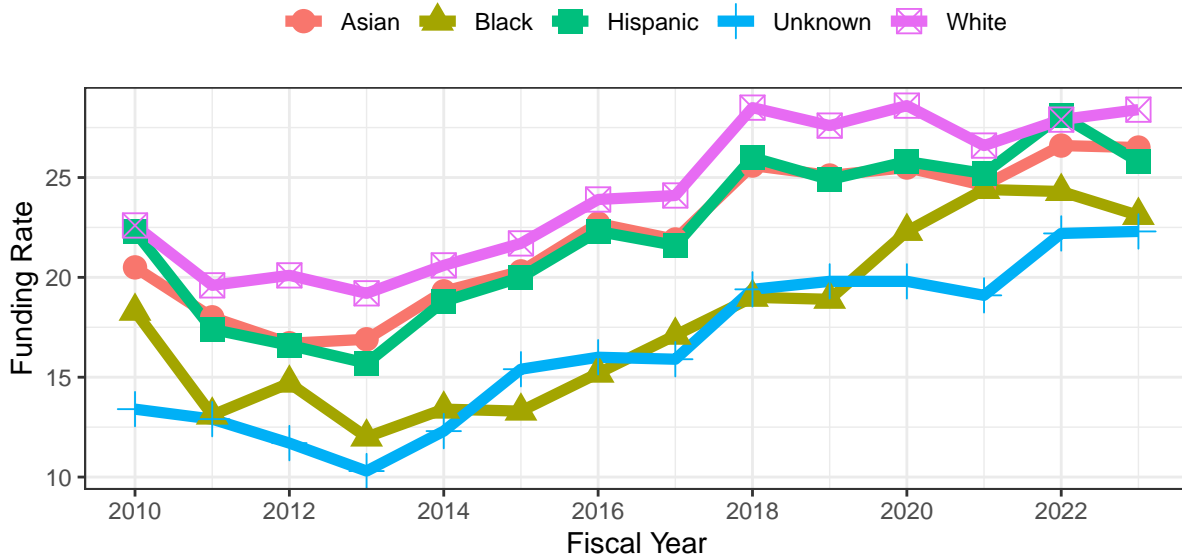
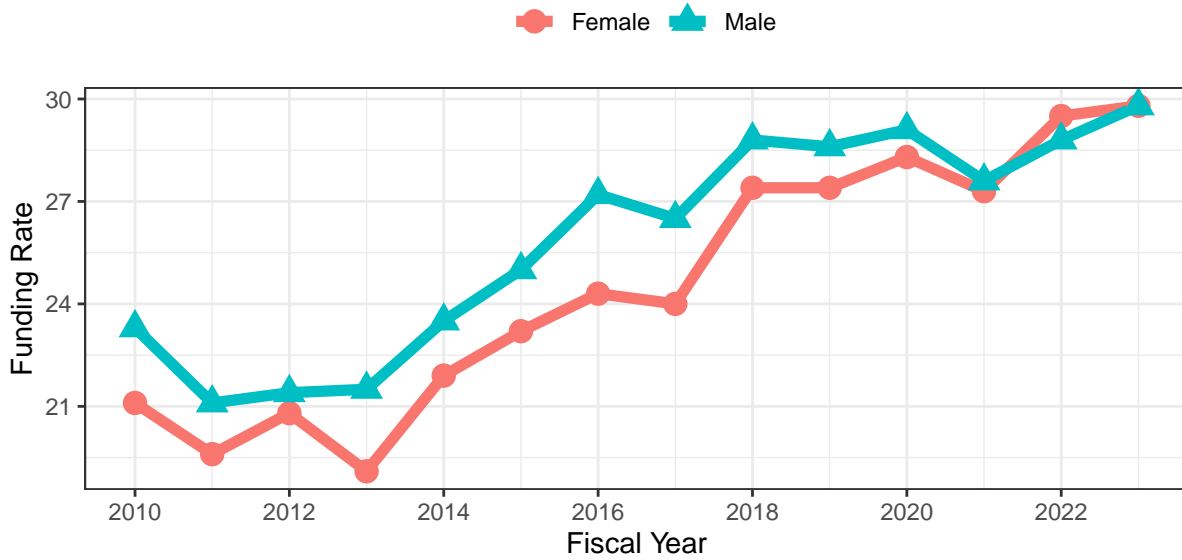


Figure 8: Funding rates for Type 1 RPG (Panel A) and Type 1 R01-Equivalent (Panel B) applicants by fiscal year according to race-ethnicity.

### A: Funding Rates Type 1 RPG Applicants



### B: Funding Rates Type 1 R01-Equivalent Applicants

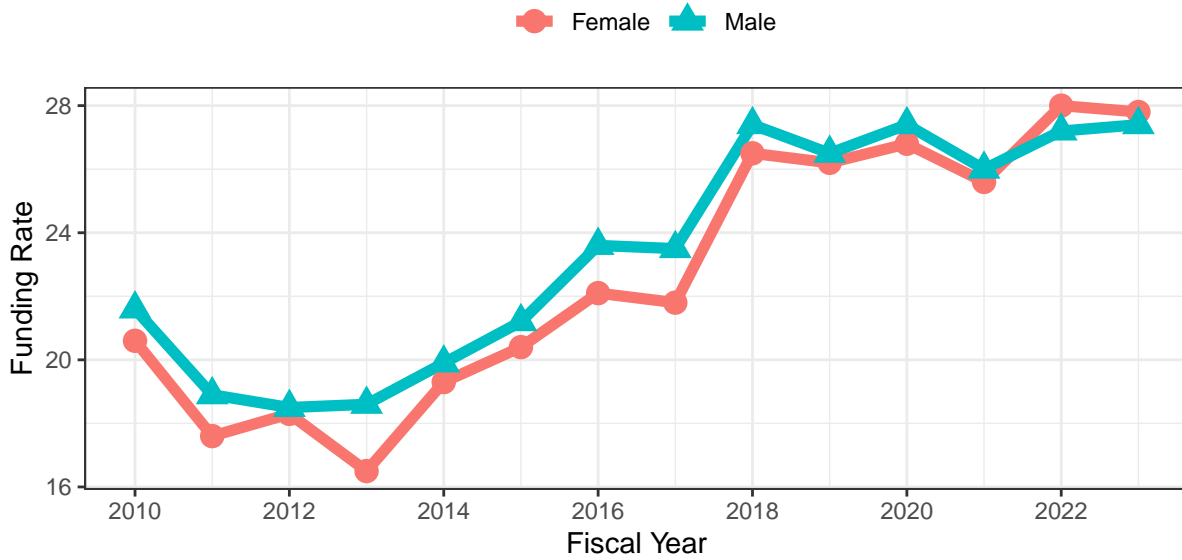


Figure 9: Funding rates for Type 1 RPG (Panel A) and Type 1 R01-Equivalent (Panel B) applicants by fiscal year according to gender. Persons with unknown gender are excluded.

Table 1: Characteristics by race-ethnicity of scientists who were designated as a Principal Investigator on at least one Type 1 FY2023 application. The numbers of prior Type 1 RPG applications and awards refers to the period of FY2010 to FY2022.

| Characteristic                                 |           | White        | Asian        | Unknown     | Hispanic    | Black       |
|--|-----------|--------------|--------------|-------------|-------------|-------------|
| Total N (%)                                    |           | 22376 (54.7) | 10798 (26.4) | 4191 (10.2) | 2263 (5.5)  | 1283 (3.1)  |
| Gender   | Male      | 13076 (58.4) | 7093 (65.7)  | 1409 (33.6) | 1245 (55.0) | 661 (51.5)  |
|  | Female    | 9040 (40.4)  | 3518 (32.6)  | 646 (15.4)  | 981 (43.3)  | 597 (46.5)  |
|  | Unknown   | 260 (1.2)    | 187 (1.7)    | 2136 (51.0) | 37 (1.6)    | 25 (1.9)    |
| Degree   | PhD       | 16232 (72.5) | 7794 (72.2)  | 1783 (42.5) | 1596 (70.5) | 815 (63.5)  |
|  | MD        | 3250 (14.5)  | 1239 (11.5)  | 400 (9.5)   | 293 (12.9)  | 210 (16.4)  |
|  | MD-PhD    | 1952 (8.7)   | 1310 (12.1)  | 237 (5.7)   | 226 (10.0)  | 132 (10.3)  |
|  | Other     | 942 (4.2)    | 455 (4.2)    | 1771 (42.3) | 148 (6.5)   | 126 (9.8)   |
| Submitted an R01-Equivalent Application        |           | 16782 (75.0) | 8170 (75.7)  | 2700 (64.4) | 1653 (73.0) | 899 (70.1)  |
| Submitted an R21 or R03 Application            |           | 6696 (29.9)  | 3743 (34.7)  | 1441 (34.4) | 732 (32.3)  | 377 (29.4)  |
| Submitted an Animal Application                |           | 10334 (46.2) | 6130 (56.8)  | 1613 (38.5) | 1041 (46.0) | 374 (29.2)  |
| Submitted a Human Application                  |           | 11398 (50.9) | 4419 (40.9)  | 2221 (53.0) | 1177 (52.0) | 871 (67.9)  |
| Early-Stage Investigator                       |           | 4005 (17.9)  | 2058 (19.1)  | 539 (12.9)  | 516 (22.8)  | 408 (31.8)  |
| Number Prior Type 1 RPG Applications           | Mean (SD) | 9.2 (9.5)    | 10.6 (11.7)  | 5.6 (9.1)   | 7.7 (9.0)   | 6.2 (8.5)   |
| Number Prior Type 1 RPG Awards                 | Mean (SD) | 1.8 (2.2)    | 1.7 (2.2)    | 0.9 (1.8)   | 1.4 (2.0)   | 0.9 (1.5)   |
| Number of FY23 Applications                    | Mean (SD) | 1.6 (1.0)    | 1.8 (1.4)    | 1.5 (1.0)   | 1.6 (1.1)   | 1.4 (0.9)   |
| Submitted from Institution of Higher Education |           | 18724 (83.7) | 9175 (85.0)  | 3318 (79.2) | 1940 (85.7) | 1130 (88.1) |
| Submitted from Research Organization           |           | 1429 (6.4)   | 633 (5.9)    | 300 (7.2)   | 134 (5.9)   | 56 (4.4)    |
| Submitted from Independent Hospital            |           | 2068 (9.2)   | 912 (8.4)    | 375 (8.9)   | 150 (6.6)   | 68 (5.3)    |
| Funded as Principal Investigator               |           | 6882 (30.8)  | 3093 (28.6)  | 896 (21.4)  | 643 (28.4)  | 296 (23.1)  |

Table 2: Characteristics by gender of scientists who were designated as a Principal Investigator on at least one Type 1 FY2023 application. The numbers of prior Type 1 RPG applications and awards refers to the period of FY2010 to FY2022.

| Characteristic                                 |           | Male         | Female       | Unknown     |
|--|-----------|--------------|--------------|-------------|
| Total N (%)                                    |           | 23484 (57.4) | 14782 (36.1) | 2645 (6.5)  |
| Race   | White     | 13076 (55.7) | 9040 (61.2)  | 260 (9.8)   |
|  | Asian     | 7093 (30.2)  | 3518 (23.8)  | 187 (7.1)   |
|  | Unknown   | 1409 (6.0)   | 646 (4.4)    | 2136 (80.8) |
|  | Hispanic  | 1245 (5.3)   | 981 (6.6)    | 37 (1.4)    |
|  | Black     | 661 (2.8)    | 597 (4.0)    | 25 (0.9)    |
| Degree   | PhD       | 16405 (69.9) | 11087 (75.0) | 728 (27.5)  |
|  | MD        | 3369 (14.3)  | 1872 (12.7)  | 151 (5.7)   |
|  | MD-PhD    | 2744 (11.7)  | 1050 (7.1)   | 63 (2.4)    |
|  | Other     | 966 (4.1)    | 773 (5.2)    | 1703 (64.4) |
| Submitted an R01-Equivalent Application        |           | 17928 (76.3) | 10754 (72.8) | 1522 (57.5) |
| Submitted an R21 or R03 Application            |           | 7357 (31.3)  | 4682 (31.7)  | 950 (35.9)  |
| Submitted an Animal Application                |           | 12854 (54.7) | 5849 (39.6)  | 789 (29.8)  |
| Submitted a Human Application                  |           | 10035 (42.7) | 8545 (57.8)  | 1506 (56.9) |
| Early-Stage Investigator                       |           | 3590 (15.3)  | 3550 (24.0)  | 386 (14.6)  |
| Number Prior Type 1 RPG Applications           | Mean (SD) | 10.7 (11.1)  | 7.7 (8.5)    | 2.3 (4.8)   |
| Number Prior Type 1 RPG Awards                 | Mean (SD) | 1.9 (2.3)    | 1.4 (1.9)    | 0.3 (1.0)   |
| Number of FY23 Applications                    | Mean (SD) | 1.7 (1.2)    | 1.5 (1.0)    | 1.3 (0.7)   |
| Submitted from Institution of Higher Education |           | 19761 (84.1) | 12447 (84.2) | 2079 (78.6) |
| Submitted from Research Organization           |           | 1442 (6.1)   | 929 (6.3)    | 181 (6.8)   |
| Submitted from Independent Hospital            |           | 2113 (9.0)   | 1272 (8.6)   | 188 (7.1)   |
| Funded as Principal Investigator               |           | 6983 (29.7)  | 4406 (29.8)  | 421 (15.9)  |

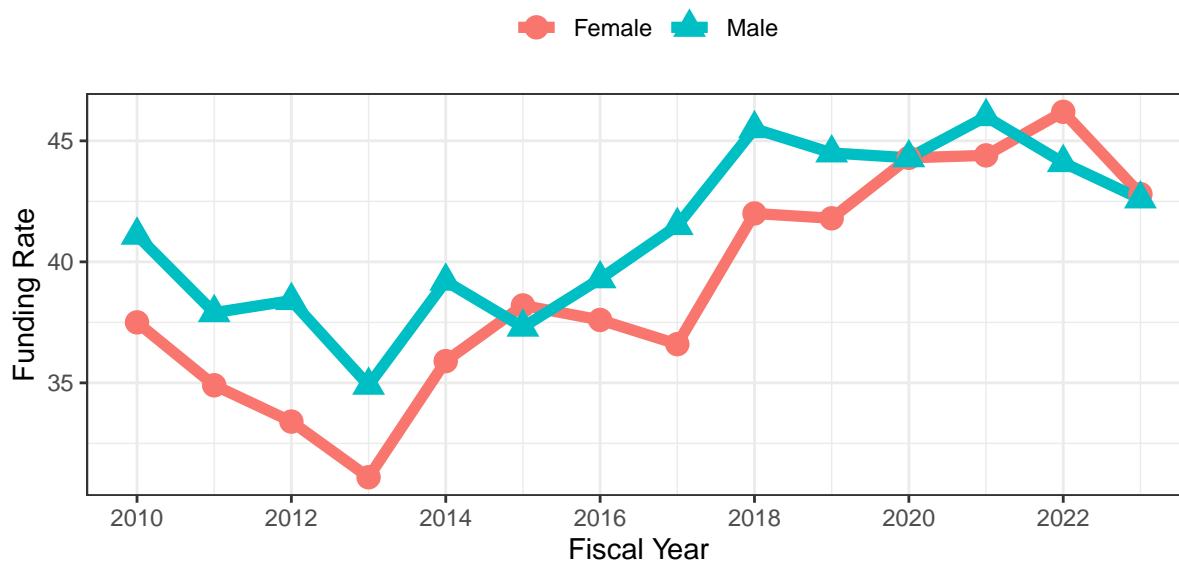
Table 3: Logistic regression models for funding of at least one FY2023 Type 1 RPG application among scientists designated as Principal Investigators. The numbers of prior Type 1 RPG applications and awards refers to the period of FY2010 to FY2022. Model 1 focuses on race only, while Model 2 focuses on gender 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)                               | -0.101*** (0.026)                |                   | -0.153*** (0.027) |
| Race Unknown (vs White)                        | -0.491*** (0.040)                |                   | -0.116* (0.050)   |
| Hispanic (vs White)                            | -0.112* (0.049)                  |                   | -0.070 (0.051)    |
| Black (vs White)                               | -0.393*** (0.068)                |                   | -0.267*** (0.070) |
| Female (vs Male)                               |                                  | 0.003 (0.023)     | 0.095*** (0.025)  |
| Gender Unknown (vs Male)                       |                                  | -0.804*** (0.055) | -0.284*** (0.071) |
| MD (vs PhD)                                    |                                  |                   | 0.139*** (0.035)  |
| MD-PhD (vs PhD)                                |                                  |                   | 0.031 (0.039)     |
| Other degree (vs PhD)                          |                                  |                   | -0.315*** (0.058) |
| Submitted R01 Equivalent                       |                                  |                   | 0.083* (0.035)    |
| Submitted R21 or R03                           |                                  |                   | -0.051 (0.031)    |
| Submitted Animal Application                   |                                  |                   | -0.092*** (0.027) |
| Submitted Human Application                    |                                  |                   | -0.103*** (0.027) |
| Early-Stage Investigator                       |                                  |                   | 0.263*** (0.032)  |
| Number Prior Type 1 RPG Applications           |                                  |                   | -0.034*** (0.002) |
| Number Prior Type 1 RPG Awards                 |                                  |                   | 0.213*** (0.008)  |
| Number FY23 Applications                       |                                  |                   | 0.436*** (0.013)  |
| Submitted from Institution of Higher Education |                                  |                   | 0.242*** (0.051)  |
| Submitted from Research Organization           |                                  |                   | 0.238*** (0.060)  |
| Submitted from Hospital                        |                                  |                   | 0.252*** (0.057)  |
| Constant                                       | -0.812*** (0.014)                | -0.860*** (0.014) | -1.905*** (0.062) |
| Observations                                   | 40,911                           | 40,911            | 40,911            |
| Log Likelihood                                 | -24,494.780                      | -24,457.150       | -23,031.930       |
| Akaike Inf. Crit.                              | 48,999.570                       | 48,920.290        | 46,105.860        |

*Note:*

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

### A: Funding Rates Type 2 RPG Applicants



### B: Funding Rates Type 2 R01-Equivalent Applicants

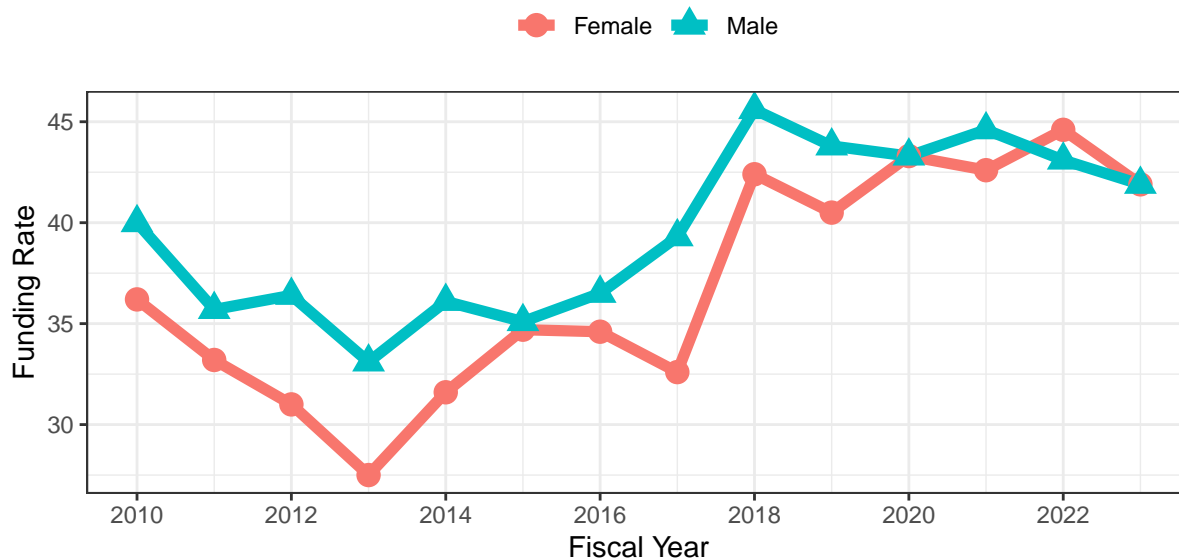


Figure 10: Funding rates for Type 2 RPG (Panel A) and Type 2 R01-Equivalent (Panel B) applicants by fiscal year according to gender. Persons with unknown gender are excluded.

Table 4: Characteristics by gender of scientists who were designated as a Principal Investigator on at least one Type 2 FY2023 application. The numbers of prior Type 1 RPG applications and awards refers to the period of FY2010 to FY2022.

| Characteristic                                 |           | Male        | Female      | Unknown   |
|--|-----------|-------------|-------------|-----------|
| Total N (%)                                    |           | 2540 (68.2) | 1118 (30.0) | 64 (1.7)  |
| Race   | White     | 1683 (66.3) | 748 (66.9)  | 10 (15.6) |
|  | Asian     | 595 (23.4)  | 254 (22.7)  | 6 (9.4)   |
|  | Unknown   | 129 (5.1)   | 45 (4.0)    | 45 (70.3) |
|  | Hispanic  | 108 (4.3)   | 56 (5.0)    | 2 (3.1)   |
|  | Black     | 25 (1.0)    | 15 (1.3)    | 1 (1.6)   |
| Degree   | PhD       | 1797 (70.7) | 873 (78.1)  | 40 (62.5) |
|  | MD        | 377 (14.8)  | 141 (12.6)  | 4 (6.2)   |
|  | MD-PhD    | 334 (13.1)  | 93 (8.3)    | 4 (6.2)   |
|  | Other     | 32 (1.3)    | 11 (1.0)    | 16 (25.0) |
| Submitted an R01-Equivalent Application        |           | 2401 (94.5) | 1044 (93.4) | 58 (90.6) |
| Submitted an Animal Application                |           | 1507 (59.3) | 585 (52.3)  | 31 (48.4) |
| Submitted a Human Application                  |           | 750 (29.5)  | 419 (37.5)  | 24 (37.5) |
| Number Prior Type 1 RPG Applications           | Mean (SD) | 13.0 (12.1) | 10.6 (8.6)  | 6.2 (5.8) |
| Number Prior Type 1 RPG Awards                 | Mean (SD) | 3.2 (2.5)   | 2.7 (2.1)   | 1.7 (1.7) |
| Submitted from Institution of Higher Education |           | 2153 (84.8) | 953 (85.2)  | 54 (84.4) |
| Submitted from Research Organization           |           | 98 (3.9)    | 48 (4.3)    | 3 (4.7)   |
| Submitted from Independent Hospital            |           | 223 (8.8)   | 93 (8.3)    | 5 (7.8)   |
| Funded as Principal Investigator               |           | 1082 (42.6) | 482 (43.1)  | 21 (32.8) |



Table 5: Logistic regression models for funding of at least one FY2023 Type 2 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 FY2022. Model 1 focuses on race only, while Model 2 focuses on gender 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)                               | -0.223** (0.081)                 |                   | -0.101 (0.086)    |
| Race Unknown (vs White)                        | 0.164 (0.141)                    |                   | 0.293 (0.158)     |
| Hispanic (vs White)                            | -0.144 (0.163)                   |                   | -0.084 (0.168)    |
| Black (vs White)                               | -0.521 (0.338)                   |                   | -0.522 (0.346)    |
| Female (vs Male)                               |                                  | 0.021 (0.073)     | 0.002 (0.076)     |
| Gender Unknown (vs Male)                       |                                  | -0.418 (0.269)    | -0.582 (0.298)    |
| MD (vs PhD)                                    |                                  |                   | 0.269* (0.105)    |
| MD-PhD (vs PhD)                                |                                  |                   | -0.111 (0.113)    |
| Other degree (vs PhD)                          |                                  |                   | -0.206 (0.293)    |
| Submitted R01 Equivalent                       |                                  |                   | -0.460** (0.144)  |
| Submitted Animal Application                   |                                  |                   | -0.518*** (0.075) |
| Submitted Human Application                    |                                  |                   | -0.107 (0.082)    |
| Number Prior Type 1 RPG Applications           |                                  |                   | -0.037*** (0.005) |
| Number Prior Type 1 RPG Awards                 |                                  |                   | 0.155*** (0.021)  |
| Number FY23 Applications                       |                                  |                   | 1.151*** (0.157)  |
| Submitted from Institution of Higher Education |                                  |                   | 0.171 (0.214)     |
| Submitted from Research Organization           |                                  |                   | 0.426 (0.269)     |
| Submitted from Hospital                        |                                  |                   | 0.071 (0.239)     |
| Constant                                       | -0.246*** (0.041)                | -0.298*** (0.040) | -0.948** (0.303)  |
| Observations                                   | 3,722                            | 3,722             | 3,722             |
| Log Likelihood                                 | -2,532.537                       | -2,537.462        | -2,421.271        |
| Akaike Inf. Crit.                              | 5,075.075                        | 5,080.923         | 4,880.542         |

*Note:*

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

[1] 2

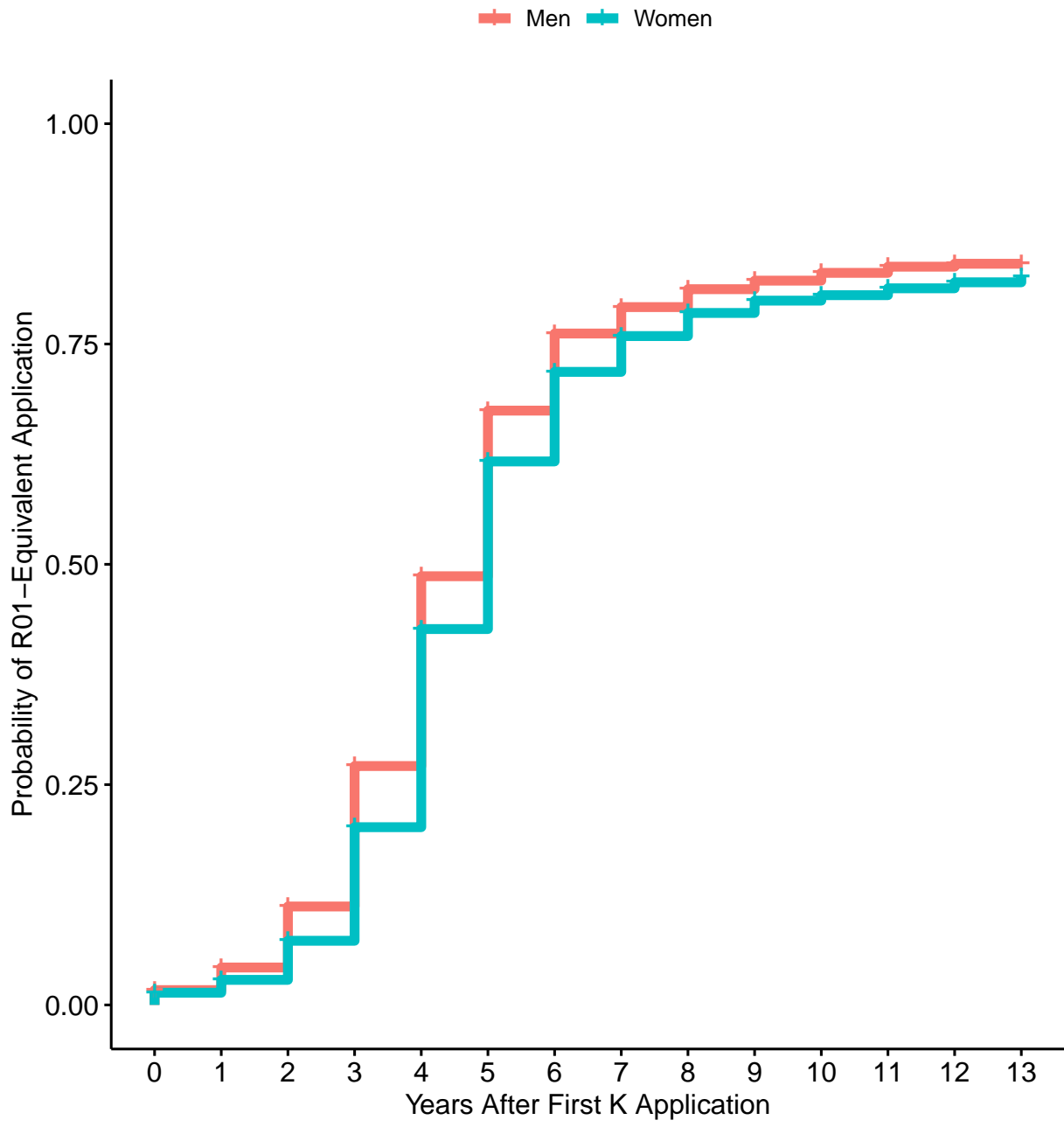


Figure 11: Years from K to R01-Equivalent Applications.

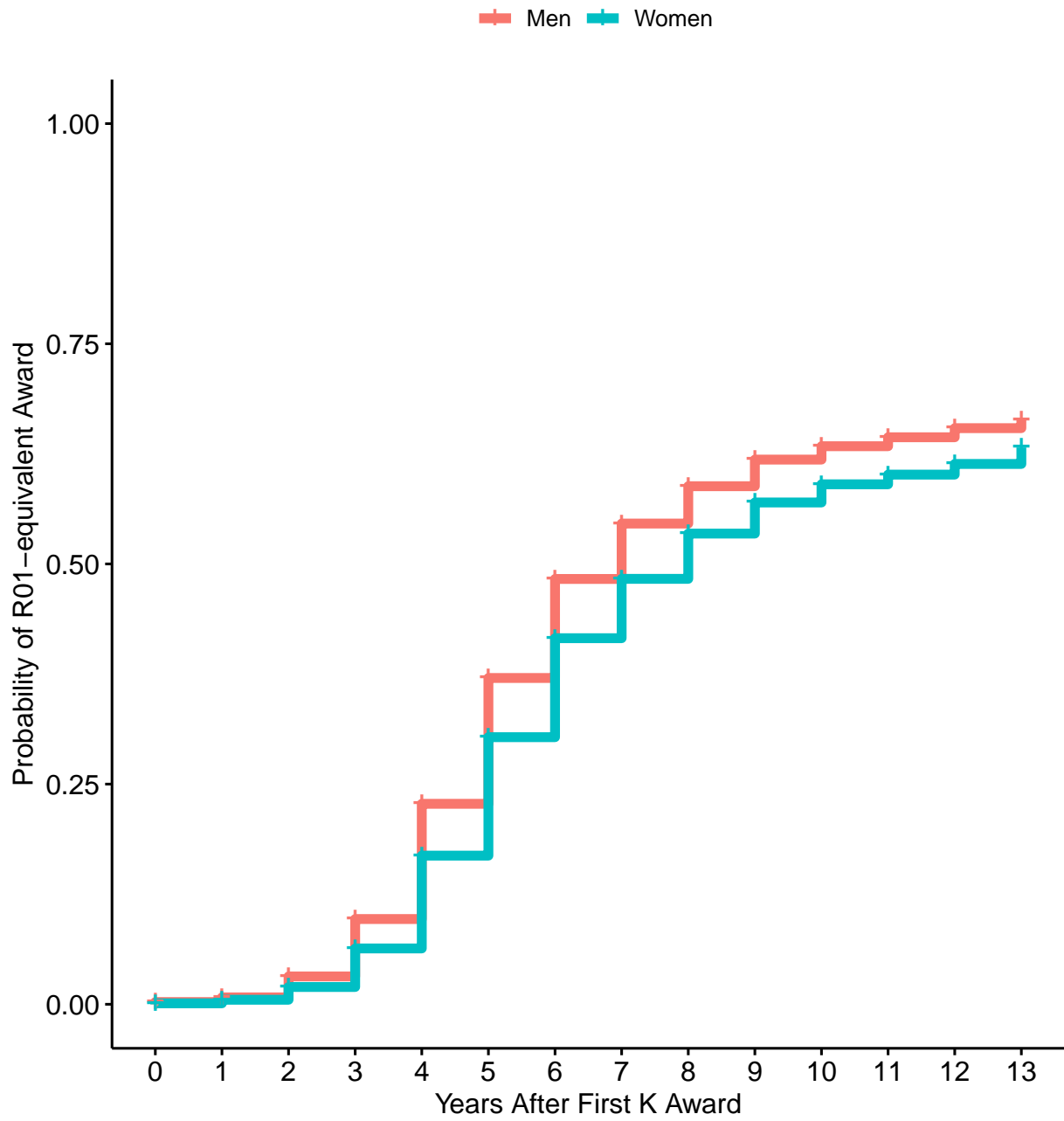


Figure 12: Years from K to R01-Equivalent Awards.