AAMC
Electronic Residency Application Service®

Supplemental ERAS® 2022-2023 Application Cycle: Evaluation of Program Signaling

Introduction

This data report summarizes the AAMC's second year of piloting program signaling, a structured process in which applicants express interest in residency programs when they apply. Program signaling was introduced to help program directors identify applicants who are genuinely interested in their programs and to empower applicants to share their preferences in a standardized process accessible to all applicants.

During the Electronic Residency Application Service® (ERAS®) 2022-2023 application cycle, applicants applying in 16 specialties had the opportunity to send program signals to programs participating in the supplemental ERAS application (Table 1). Applicants could send the maximum number of signals in each specialty they applied to. The number of available signals was determined jointly by specialty leaders and AAMC assessment experts. (The AAMC recommended to specialty leaders that the number of signals for each specialty be less than 10% of the average number of applications and less than 5% of programs in the specialty.) Specialty leaders decided whether to allow applicants to send signals to programs affiliated with their MD- or DO-granting school (hereafter referred to as "medical school") or any program where applicants completed an in-person clinical sub-internship or away rotation.

Specialty-specific data and key takeaways for each evaluation question are summarized in Tables 1-13. Those results, along with data from applicant, advisor, and program director surveys and focus groups, will be used to refine the AAMC's program-signaling offerings. (Percentage values in tables may not total 100% due to rounding and cells with fewer than five observations.)

This document summarizes results from the first stage of the evaluation of program signals:

1. How many signals did applicants send? Were there differences by applicant race/ethnicity, gender, and/or applicant type in the number of signals sent?
2. How many applicants signaled programs located in the same U.S. census division as their permanent address or their medical school location?
3. What is the relationship between geographic preferences and program signals?
4. How were program signals distributed within specialties?
5. What is the relationship between a program's characteristics and the number of signals it received?

A future report, planned for delivery in the first quarter of 2023, will summarize the relationship between program signaling and the probability of being invited to interview in participating specialties.

Table 1. Number of Available Signals in the 2022-2023 Application Cycle

Specialty	Number of Available Signals	Is There a Specialty Policy for Signaling Home-Institution and In-Person Clinical Sub-Internships or Away Rotations?
Adult Neurology	3	Yes
Anesthesiology	5	Yes
Dermatology	3	No
Diagnostic Radiology and Interventional Radiology	6	Yes[1]
Emergency Medicine	5	No
General Surgery	5	Yes
Internal Medicine - Categorical	7	No
Internal Medicine/Psychiatry	2	Yes
Neurological Surgery	8	Yes
Obstetrics and Gynecology	3 Gold[2] 15 Silver	Yes
Orthopedic Surgery	30	Yes
Pediatrics	5	Yes[1]
Physical Medicine and Rehabilitation	4	Yes
Psychiatry	5	Yes[1]
Public Health and General Preventive Medicine	3	Yes

1. The specialty advised applicants to signal their home institution unless the institution instructed them not to do so.

2. This specialty elected to have three Gold signals (highest interest) and 15 Silver signals (very high interest).

Methods

Sample

Program participation rates ranged from 76% to 98% (Table 2). As of Oct. 3, 2022, most applicants to participating specialties sent program signals; however, applicant participation varied by specialty and ranged from 70% to 98% (Table 3). The demographic composition of the specialty-specific samples was comparable to their respective 2022-2023 ERAS populations (Tables 4 and 5), except for the Interventional Radiology sample, where there was a smaller proportion of international medical graduates (IMGs), and the Internal Medicine/Psychiatry sample, where there was a slightly larger proportion of MDs compared with the overall ERAS 2022-2023 application population.

Table 2. Program Participation Rate, by Specialty, 2022-2023

Specialty	Programs Participating in Program Signaling		Number of Programs Participating in ERAS[1]
	Percentage	Number	
Adult Neurology	90%	155	172
Anesthesiology	97%	154	158
Dermatology	90%	123	137
Diagnostic Radiology	98%	186	189
Interventional Radiology	95%	86	91
Emergency Medicine	95%	261	276
General Surgery	84%	283	338
Internal Medicine - Categorical	85%	513	587
Internal Medicine/Psychiatry	100%	13	13
Neurological Surgery	96%	110	115
Obstetrics and Gynecology	95%	273	286
Orthopedic Surgery	91%	182	199
Pediatrics	97%	200	207
Physical Medicine and Rehabilitation	94%	95	101
Psychiatry	89%	256	288
Public Health and General Preventive Medicine	76%	26	34

1. Five programs were excluded from the analysis due to changes in their ERAS 2023 participation status or because they didn't receive any program signals.

Table 3. Percentage and Number of Applicants Who Sent Program Signals, by Specialty, 2022-2023

Specialty	Applicants Who Sent Program Signals as of Sept. 16, 2022[1]		Number of Applicants as of Oct. 3, 2022
	Percentage	Number	
Adult Neurology	88%	1,762	2,005
Anesthesiology	95%	3,242	3,415
Dermatology	95%	954	1,001
Diagnostic Radiology	92%	2,098	2,291
Interventional Radiology	68%	274	401
Emergency Medicine	94%	2,800	2,989
General Surgery	77%	3,749	4,866
Internal Medicine - Categorical	89%	15,627	17,538
Internal Medicine/Psychiatry	76%	196	257
Neurological Surgery	92%	399	435
Obstetrics and Gynecology	96%	2,334	2,422
Orthopedic Surgery	97%	1,556	1,603
Pediatrics	90%	4,109	4,589
Physical Medicine and Rehabilitation	93%	935	1,006
Psychiatry	90%	3,312	3,665
Public Health and General Preventive Medicine	70%	89	128

1. Applicants could apply to more than one specialty and were included in each specialty they applied to. The number and percentage of applicants who cross-applied are available in Appendix A.

Table 4. Percentage and Number of Applicants Who Sent Program Signals, by Race/Ethnicity and Specialty, 2022-2023

Specialty[1]	White Only	Asian	Black or African American	American Indian or Alaska Native	Native Hawaiian or Other Pacific Islander	Multiple Race/ Ethnicity	Hispanic, Latino, or of Spanish Origin	Other Race/ Ethnicity	Unknown Race/ Ethnicity
Adult Neurology	32% (567)	42% (742)	7% (121)	0.3% (6)	--[2]	8% (144)	9% (156)	8% (148)	3% (46)
Anesthesiology	44% (1,428)	29% (943)	9% (292)	0.7% (23)	0.2% (7)	10% (335)	11% (370)	6% (208)	2% (69)
Dermatology	41% (390)	28% (266)	11% (109)	0.9% (9)	0.5% (5)	11% (109)	10% (97)	9% (84)	3% (30)
Diagnostic Radiology	43% (904)	33% (700)	6% (130)	0.5% (10)	0.5% (10)	10% (205)	9% (185)	7% (149)	3% (56)
Interventional Radiology	46% (125)	31% (84)	7% (20)	--	--	9% (26)	7% (20)	8% (22)	2% (5)
Emergency Medicine	56% (1,566)	19% (533)	8% (221)	1% (28)	0.3% (8)	11% (303)	11% (305)	6% (168)	2% (51)
General Surgery	45% (1,688)	25% (933)	9% (344)	1% (37)	0.25% (13)	11% (428)	13% (496)	7% (268)	2% (90)
Internal Medicine - Categorical	27% (4,153)	46% (7,171)	10% (1,553)	0.4% (55)	0.2% (24)	7% (1,111)	10% (1,500)	7% (1,128)	2% (352)
Internal Medicine/ Psychiatry	38% (74)	27% (52)	13% (26)	--	--	6% (11)	11% (21)	7% (14)	5% (10)
Neurological Surgery	39% (156)	27% (107)	10% (40)	--	--	11% (43)	13% (52)	8% (31)	4% (16)
Obstetrics and Gynecology	47% (1,100)	21% (480)	14% (326)	0.9% (21)	0.2% (5)	11% (254)	13% (309)	5% (116)	1% (31)
Orthopedic Surgery	58% (910)	19% (297)	8% (127)	1% (15)	0.4% (6)	9% (141)	9% (137)	5% (80)	2% (28)

(continued)

Table 4. Percentage and Number of Applicants Who Sent Program Signals, by Race/Ethnicity and Specialty, 2022-2023 *(continued)*

Specialty[1]	White Only	Asian	Black or African American	American Indian or Alaska Native	Native Hawaiian or Other Pacific Islander	Multiple Race/ Ethnicity	Hispanic, Latino, or of Spanish Origin	Other Race/ Ethnicity	Unknown Race/ Ethnicity
Pediatrics	41% (1,693)	32% (1,311)	9% (386)	0.7% (27)	0.1% (5)	9% (368)	12% (481)	5% (223)	2% (78)
Physical Medicine and Rehabilitation	42% (391)	32% (295)	9% (84)	0.6% (6)	--	11% (101)	11% (107)	6% (59)	2% (18)
Psychiatry	34% (1,142)	36% (1,187)	12% (399)	0.9% (30)	0.3% (9)	10% (322)	11% (363)	6% (214)	2% (77)
Public Health and General Preventive Medicine	27% (24)	43% (38)	16% (14)	--	--	8% (7)	9% (8)	6% (5)	--

1. Applicants could apply to more than one specialty and were included in each specialty they applied to. Applicants could select more than one race/ethnicity, so the total could be greater than 100%. “White Only” refers to applicants who selected only White as their race/ethnicity. “Multiple Race/Ethnicity" refers to applicants who selected more than one race/ethnicity.

2. Dashes indicate cells with fewer than five observations.

Table 5. Percentage and Number of Applicants Who Sent Program Signals, by Gender, Applicant Type, and Specialty, 2022-2023

Specialty[1]	Gender[2]				Applicant Type		
	Men	Women	Declined to Indicate	Another Gender Identity	MD	DO	IMG
Adult Neurology	53% (940)	47% (820)	--[2]	--	38% (662)	14% (247)	48% (853)
Anesthesiology	65% (2,117)	35% (1,119)	--	--	62% (2,023)	21% (666)	17% (553)
Dermatology	33% (312)	67% (642)	--	--	77% (733)	14% (130)	10% (91)
Diagnostic Radiology	74% (1,546)	26% (551)	--	--	64% (1,334)	17% (358)	19% (406)
Interventional Radiology	78% (214)	22% (60)	--	--	68% (186)	16% (45)	16% (43)
Emergency Medicine	57% (1,589)	43% (1,195)	--	0.5% (15)	51% (1,417)	31% (857)	19% (526)
General Surgery	53% (2,002)	46% (1,736)	--	0.3% (11)	54% (2,017)	16% (607)	30% (1,125)
Internal Medicine - Categorical	54% (8,376)	46% (7,240)	--	0.04% (7)	29% (4,456)	15% (2,293)	57% (8,878)
Internal Medicine/ Psychiatry	48% (94)	51% (99)	--	--	41% (80)	9% (18)	50% (98)
Neurological Surgery	71% (284)	29% (114)	--	--	78% (311)	4% (17)	18% (71)
Obstetrics and Gynecology	13% (306)	86% (2,016)	--	0.5% (11)	61% (1,415)	19% (450)	20% (469)
Orthopedic Surgery	78% (1,214)	22% (342)	--	--	75% (1,174)	19% (290)	6% (92)

(continued)

Table 5. Percentage and Number of Applicants Who Sent Program Signals, by Gender, Applicant Type, and Specialty, 2022-2023 *(continued)*

Specialty[1]	Gender[2]				Applicant Type		
	Men	Women	Declined to Indicate	Another Gender Identity	MD	DO	IMG
Pediatrics	28% (1,144)	72% (2,956)	--	0.2% (9)	46% (1,902)	18% (748)	36% (1,459)
Physical Medicine and Rehabilitation	67% (625)	33% (307)	--	--	45% (421)	38% (352)	17% (162)
Psychiatry	48% (1,579)	52% (1,706)	--	0.7% (23)	50% (1,653)	19% (628)	31% (1,031)
Public Health and General Preventive Medicine	55% (49)	45% (40)	--	--	25% (22)	9% (8)	66% (59)

1. Applicants could apply to more than one specialty and were included in each specialty they applied to.

2. Dashes indicate cells with fewer than five observations.

Analysis

Data were analyzed separately for each specialty because applicant pools and application processes differ by specialty. Descriptive statistics, including frequencies, percentages, means, standard deviations, Pearson correlations, and linear regression, were used to investigate signaling. Group differences were evaluated by computing ANOVAs, t tests, Cohen *d* (for means), and Cohen *h* (for proportions) (Cohen 1988).

Results

How many signals did applicants send, and did the number of signals sent differ by race/ethnicity, gender, or applicant type?

- Less than 1% of applicants who submitted a supplemental ERAS application sent zero signals. Differences in the percentage of applicants who sent zero signals by specialty, applicant type, race/ethnicity, or gender did not reach the threshold for a practical effect.

- Most applicants sent the maximum number of signals (Table 6). In most specialties, of applicants who signaled, the average number of signals sent by those who self-identified as non-White was about the same as for those who self-identified as White (Table B.1). The numbers of signals sent by men and women were about the same across specialties. Sample sizes were small for applicants who identified as another gender, so more research is needed (Table B.2). There were some small to medium effect-size differences across applicant types (Table B.3):

    - MD applicants sent slightly more signals than did DO applicants in:
        - Interventional Radiology
        - Orthopedic Surgery

    - MD applicants sent slightly more signals than did IMG applicants in:
        - Emergency Medicine
        - Interventional Radiology
        - Obstetrics and Gynecology
        - Orthopedic Surgery
        - Psychiatry

Table 6. Mean and Standard Deviation of Program Signals, by Specialty, 2022-2023

Specialty	Number of Available Signals	Mean	Standard Deviation
Adult Neurology	3	2.98	0.17
Anesthesiology	5	4.97	0.31
Dermatology	3	2.97	0.22
Diagnostic Radiology	6[1]	5.62	1.03
Interventional Radiology		3.67	1.87
Emergency Medicine	5	4.94	0.40
General Surgery	5	4.95	0.40
Internal Medicine - Categorical	7	6.89	0.62

(continued)

Table 6. Mean and Standard Deviation of Program Signals, by Specialty, 2022-2023 *(continued)*

Specialty	Number of Available Signals	Mean	Standard Deviation
Internal Medicine/Psychiatry	2	1.97	0.17
Neurological Surgery	8	7.87	0.85
Obstetrics and Gynecology	3 Gold[2] 15 Silver	17.64	1.94
Orthopedic Surgery[3]	30	28.58	5.10
Pediatrics	5	4.93	0.46
Physical Medicine and Rehabilitation	4	3.97	0.28
Psychiatry	5	4.94	0.42
Public Health and General Preventive Medicine	3	2.70	0.65

1. Diagnostic Radiology and Interventional Radiology shared six signals. Applicants who applied to one or both specialties could send a total of six signals.

2. This specialty elected to have three Gold signals (highest interest) and 15 Silver signals (very high interest).

3. In follow-up, we explored whether the number of applications submitted was a possible explanation for the difference in mean number of signals by applicant type. On average, applicants who applied to fewer than 30 programs sent about 15 program signals, and applicants who applied to 30 or more programs sent about 29 signals. This effect was constant for MD, DO, and IMG applicants.

How many applicants signaled programs located in the same U.S. census division as their permanent address or their medical school location?

- On average, 30%-52% of program signals were sent to programs located in divisions that align with applicants' permanent addresses, and 26%-45% of program signals were sent to programs located in the same division as their medical schools (Table 7). This finding varied somewhat by specialty, with a slightly smaller proportion of program signals being sent to permanent addresses or medical school locations in the more competitive specialties and in smaller specialties that tend to have fewer programs in each division.

- There were some differences by race/ethnicity and applicant type in the percentage of program signals sent to programs in divisions that align with applicants' permanent addresses and their medical schools (Table 8). There were no meaningful differences by gender.

- Hispanic (50%) and Asian (51%) applicants and those who self-identified as Other Race/Ethnicity (54%) sent a slightly higher proportion of their program signals to programs aligned with their permanent address than did Black (44%), Native Hawaiian or Pacific Islander (PI) (46%), White (45%), and Multiracial (47%) applicants.

- American Indian or Alaska Native (38%) and missing race/ethnicity applicants (18%) sent a smaller proportion of their signals to programs aligned with their permanent address, perhaps due to fewer programs in their home census divisions.

- Native Hawaiian and PI (34%), American Indian or Alaska Native (36%), and applicants with missing race/ethnicity data (28%) sent a smaller proportion of their signals to programs in divisions located in the same geographic region as their medical schools than did Hispanic (43%), Black (38%), Asian (42%), White (40%), and Multiracial (39%) applicants and those who identify as Other (43%).

- DO applicants sent a higher proportion of their signals (55%) to programs in divisions that align with their permanent address than did MD applicants (45%).

- Applicants who self-reported another gender identity (AGI) sent a smaller proportion of their program signals to programs in divisions that aligned with their permanent address (41%) and with their medical school location (34%) than did applicants identifying as men or women or applicants who declined to answer.

Table 7. Percentage and Number of Program Signals Sent by MD and DO Applicants to Programs in Census Divisions That Align With Their Permanent Address or Medical School Location, by Specialty, 2022-2023[1]

Specialty (Number of Participating Programs)	Permanent Address		Medical School	
	Permanent Address Division Signaled (%)	Number of Permanent Address Signals	Medical School Division Signaled (%)	Number of Medical School Signals
Adult Neurology (155)	50%	2,691	42%	2,709
Anesthesiology (154)	48%	13,326	42%	13,361
Dermatology (123)	45%	2,555	38%	2,567
Diagnostic Radiology (186)	50%	9,474	44%	9,521
Interventional Radiology (86)	45%	885	38%	885
Emergency Medicine (261)	47%	11,242	40%	11,277
General Surgery (283)	47%	12,916	40%	12,986
Internal Medicine - Categorical (513)	52%	46,279	43%	46,501
Internal Medicine/Psychiatry (13)	33%	192	34%	192
Neurological Surgery (110)	30%	2,553	29%	2,585
Obstetrics and Gynecology (273)	42%	33,131	37%	33,275
Orthopedic Surgery (182)	34%	41,853	31%	42,003
Pediatrics (200)	49%	13,028	42%	13,059
Physical Medicine and Rehabilitation (95)	50%	3,063	42%	3,071
Psychiatry (256)	52%	11,263	45%	11,298
Public Health and General Preventive Medicine (26)	46%	80	26%	80

1. IMG applicants were excluded from these analyses because most of their permanent addresses were international and do not correspond with a U.S. census division. Non-IMG applicants whose permanent address was in Canada were excluded from “permanent address” analyses because they are not included in a U.S. census division.

Table 8. Percentage and Number of Program Signals Sent by MD and DO Applicants to Programs in Census Divisions That Align With Their Permanent Address or Medical School Location, by Race/Ethnicity, Gender, Applicant Type, and Specialty, 2022-2023

Characteristic[1]	Permanent Address		Medical School	
	Permanent Address Division Signaled (%)	Number of Permanent Address Signals	Medical School Division Signaled %	Number of Medical School Signals
Race/Ethnicity				
American Indian or Alaska Native	38%	1,792	36%	1,805
Asian	51%	23,770	42%	54,124
Black or African American	44%	16,146	38%	16,222
Hispanic	50%	20,555	43%	20,577
Native Hawaiian or Other Pacific Islander	46%	682	34%	694
White Only	46%	122,896	40%	123,276
Other Race/Ethnicity	54%	10,360	43%	10,393
Multiple Race/Ethnicity	47%	20,778	39%	20,833
Unknown Race/Ethnicity	18%	38	28%	38

(continued)

Table 8. Percentage and Number of Program Signals Sent by MD and DO Applicants to Programs in Census Divisions That Align With Their Permanent Address or Medical School Location, by Race/Ethnicity, Gender, Applicant Type, and Specialty, 2022-2023 *(continued)*

Characteristic[1]	Permanent Address		Medical School	
	Permanent Address Division Signaled (%)	Number of Permanent Address Signals	Medical School Division Signaled %	Number of Medical School Signals
Gender				
Woman	47%	100,408	40%	100,876
Man	48%	106,426	41%	106,805
Another gender identity	41%	517	34%	522
Declined to answer	32%	46	23%	46
Applicant Type				
DO	55%	54,856	42%	55,115
MD	45%	152,541	40%	153,134

1. “White Only” refers to applicants who selected only White as their race/ethnicity. “Multiple Race/Ethnicity" refers to applicants who selected more than one race/ethnicity. IMG applicants were excluded from these analyses because most of their permanent addresses were international and do not correspond with a U.S. census division.

What is the relationship between geographic preference and program signals?

Among applicants who indicated a geographic preference, 77%-89% of their program signals were sent to programs located in geographic divisions they also preferred (Table 9).

Table 9. Percentage of Applicants Who Sent Both Program Signals and Geographic Preferences Whose Signals and Preferences Were Aligned, 2022-2023[1]

Specialty	Program Signals and Geographic Preferences	
	Aligned (%)	NOT Aligned (%)
Adult Neurology	85%	15%
Anesthesiology	89%	11%
Dermatology	86%	14%
Diagnostic Radiology	87%	13%
Interventional Radiology	84%	16%
General Surgery	84%	16%
Internal Medicine - Categorical	88%	12%
Internal Medicine/Psychiatry	83%	17%
Neurological Surgery	78%	22%
Orthopedic Surgery	77%	23%
Pediatrics	89%	11%
Physical Medicine and Rehabilitation	87%	13%
Psychiatry	89%	11%
Public Health and General Preventive Medicine	82%	18%

1. Applicants who selected “No Geographic Preference” were excluded from this analysis. The number and proportion of applicants who selected "No Geographic Preference” are reported in the *Supplemental ERAS® Application 2022-2023 Cycle: Evaluation of Geographic Preferences* data report.

How were program signals distributed?

- As in year 1, we found that application volume was positively correlated with the number of signals a program received. Therefore, we adjusted the distributions of program signals to account for application volume.

- Signals were not distributed equally across programs, even after controlling for application volume (Appendix C). On average, programs in 11 of the 16 participating specialties received signals from 10% or fewer of their applicants. However, there was a lot of variation, with some programs receiving signals from nearly half their applicants and others receiving signals from less than 5% of their applicants. This finding held across all specialties, regardless of whether the specialty used a "small" or "large" number-of-signals approach (Table 10).

- In all specialties except Orthopedic Surgery, 10% of programs received more than 20% of all signals sent by applicants this cycle (Table 11).

Table 10. Mean Number of Signals and Percentage of Signals Received by Programs Relative to the Number of Applications, by Specialty, 2022-2023

Specialty	Number of Program Signals Received			Percentage of Signals Received Relative to Applications		
	Mean (Per Program)	Minimum	Maximum	Mean (Per Program)	Minimum	Maximum
Adult Neurology	33.87	2	101	5%	1%	18%
Anesthesiology	104.55	14	278	7%	2%	19%
Dermatology	23.06	3	76	4%	1%	11%
Diagnostic Radiology	63.4	5	206	7%	1%	18%
Interventional Radiology	11.84	1	40	7%	1%	23%
Emergency Medicine	53.05	2	203	8%	1%	22%
General Surgery	65.77	9	230	6%	1%	13%
Internal Medicine - Categorical	211.11	5	1,222	8%	1%	35%
Internal Medicine/Psychiatry	29.69	14	57	20%	11%	34%
Neurological Surgery	28.55	6	85	10%	3%	25%
Obstetrics and Gynecology	150.8	25	440	22%	8%	43%
Orthopedic Surgery	244.33	42	540	37%	17%	67%
Pediatrics	101.29	9	440	9%	3%	25%
Physical Medicine and Rehabilitation	39.10	6	121	8%	2%	20%
Psychiatry	64.13	6	240	7%	1%	19%
Public Health and General Preventive Medicine	9.23	1	20	25%	4%	54%

Table 11. Number and Percentage of Signals Sent to 10% of Programs, 2022-2023

Specialty	10% of Participating Programs	Percentage of Signals Received by 10% of Programs	Number of Signals Received by 10% of Programs	Total Number of Signals Received
Adult Neurology	15	22%	1,160	5,250
Anesthesiology	15	21%	3,456	16,100
Dermatology[1]	12	22%	624	2,836
Diagnostic Radiology	19	22%	2,650	11,793
Interventional Radiology	9	28%	278	1,006
Emergency Medicine	26	28%	3,882	13,845
General Surgery[2]	28	28%	5,176	18,546
Internal Medicine – Categorical[3]	51	31%	33,053	107,668
Internal Medicine/Psychiatry	--[4]	--	--	--
Neurological Surgery	11	24%	759	3,140
Obstetrics and Gynecology	27	21%	8,642	41,168
Orthopedic Surgery	18	17%	7,581	44,468
Pediatrics	20	26%	5,215	20,258
Physical Medicine and Rehabilitation	9	22%	816	3,675
Psychiatry	26	26%	4,258	16,354
Public Health and General Preventive Medicine	--	--	--	--

1. In the 2021-2022 cycle, 25% of Dermatology programs received 48% of all Dermatology signals, compared with 46% of all Dermatology signals in the 2022-2023 cycle.

2. In the 2021-2022 cycle, 25% of General Surgery programs received 52% of all General Surgery signals, compared with 54% of all General Surgery signals in the 2022-2023 cycle.

3. In the 2021-2022 cycle, 25% of Internal Medicine - Categorical programs received 53% of all Internal Medicine - Categorical signals, compared with 55% in the 2022-2023 cycle.

4. Dashes indicate cells with fewer than five observations.

What is the relationship between program characteristics and the number of signals received?

When evaluating effect size of correlations in the social sciences, <0.10 is not a practical effect, 0.10-0.29 is small, 0.30-0.49 is medium, and ≥0.50 is large. Tables 12 and 13 show the relationship between program characteristics and the number of signals received.

- **Number of Applicants and Number of Entering Residents**
  - Across most specialties, there were medium-to-large positive associations between the number of signals received and the number of applicants and between the number of signals received and the number of entering residents.

- **Proportion of Residents Who Self-Identified a Race/Ethnicity That Is URiM**
  - There was no association between the number of signals received and the proportion of current residents who identified a race/ethnicity that is underrepresented in medicine (URiM), except in Obstetrics and Gynecology, where there was a small positive correlation.

- **Proportion of Residents Who Are IMG Graduates**
  - There was no association between the number of signals received and the proportion of current residents who are IMG graduates, except in Anesthesiology and Emergency Medicine, where there are small negative correlations, and General Surgery, where the correlation was small and positive.

- **Proportion of Residents Who Are DO Graduates**
  - There were medium-to-large negative associations between the number of signals received and the proportion of current DO residents in most specialties, except for Dermatology, Neurological Surgery, and Physical Medicine and Rehabilitation, where there was no association.

- **Program Affiliation**
  - We conducted an ANOVA to explore differences in program signals received by program setting (Internal Medicine/Psychiatry and Public Health and General Preventive Medicine were excluded from the analysis due to sample size). For most specialties, there were differences in the number of program signals received by program setting (i.e., university-based, community-university-affiliated, or community-based). For these specialties, there were no differences by program setting:
    - Dermatology
    - Neurological Surgery
    - Physical Medicine and Rehabilitation

Table 12. Correlation Between Program Characteristics and the Number of Signals Received, by Characteristic and Specialty, 2022-2023

Specialty and Characteristic[1]	Number of Programs	Correlation Coefficient[2]	*P*-value
Adult Neurology			
Number of Applicants	155	0.58	0.00
Number of Entering Residents	143	0.58	0.00
Percentage of Current Residents Who Are URiM	143	-0.15	0.07
Percentage of Current Residents Who Are DOs	143	-0.43	0.00
Percentage of Current Residents Who Are IMGs	143	-0.01	0.94
Anesthesiology			
Number of Applicants	154	0.71	0.00
Number of Entering Residents	149	0.70	0.00
Percentage of Current Residents Who Are URiM	149	0.13	0.12
Percentage of Current Residents Who Are DOs	149	-0.46	0.00
Percentage of Current Residents Who Are IMGs	149	-0.23	0.00
Dermatology			
Number of Applicants	123	0.42	0.00
Number of Entering Residents	122	0.43	0.00
Percentage of Current Residents Who Are URiM	122	-0.03	0.78
Percentage of Current Residents Who Are DOs	122	-0.07	0.43
Percentage of Current Residents Who Are IMGs	122	-0.04	0.63
Diagnostic Radiology			
Number of Applicants	186	0.68	0.00
Number of Entering Residents	182	0.57	0.00
Percentage of Current Residents Who Are URiM	182	0.09	0.23
Percentage of Current Residents Who Are DOs	182	-0.35	0.00
Percentage of Current Residents Who Are IMGs	182	-0.11	0.15
Interventional Radiology			
Number of Applicants	85	0.56	0.00
Number of Entering Residents	82	0.34	0.00
Percentage of Current Residents Who Are URiM	82	0.09	0.42
Percentage of Current Residents Who Are DOs	82	-0.35	0.00
Percentage of Current Residents Who Are IMGs	82	-0.14	0.22

(continued)

Table 12. Correlation Between Program Characteristics and the Number of Signals Received, by Characteristic and Specialty, 2022-2023 *(continued)*

Specialty and Characteristic[1]	Number of Programs	Correlation Coefficient[2]	*P*-value
Emergency Medicine[3]			
Number of Applicants	261	0.85	0.00
Number of Entering Residents	253	0.52	0.00
Percentage of Current Residents Who Are URiM	253	0.10	0.10
Percentage of Current Residents Who Are DOs	253	-0.52	0.00
Percentage of Current Residents Who Are IMGs	253	-0.13	0.04
General Surgery			
Number of Applicants	282	0.84	0.00
Number of Entering Residents	266	0.38	0.00
Percentage of Current Residents Who Are URiM	266	0.03	0.61
Percentage of Current Residents Who Are DOs	266	-0.42	0.00
Percentage of Current Residents Who Are IMGs	266	0.20	0.00
Internal Medicine - Categorical			
Number of Applicants	510	0.66	0.00
Number of Entering Residents	484	0.51	0.00
Percentage of Current Residents Who Are URiM	484	-0.08	0.07
Percentage of Current Residents Who Are DOs	484	-0.44	0.00
Percentage of Current Residents Who Are IMGs	484	-0.00[4]	0.92
Internal Medicine/Psychiatry			
Number of Applicants	--[5]	--	--
Number of Entering Residents	--	--	--
Percentage of Current Residents Who Are URiM	--	--	--
Percentage of Current Residents Who Are DOs	--	--	--
Percentage of Current Residents Who Are IMGs	--	--	--
Neurological Surgery			
Number of Applicants	110	0.75	0.00
Number of Entering Residents	107	0.43	0.00
Percentage of Current Residents Who Are URiM	107	-0.08	0.39
Percentage of Current Residents Who Are DOs	107	-0.17	0.09
Percentage of Current Residents Who Are IMGs	107	-0.11	0.28

(continued)

Table 12. Correlation Between Program Characteristics and the Number of Signals Received, by Characteristic and Specialty, 2022-2023 *(continued)*

Specialty and Characteristic[1]	Number of Programs	Correlation Coefficient[2]	*P*-value
Obstetrics and Gynecology			
Number of Applicants	273	0.87	0.00
Number of Entering Residents	264	0.52	0.00
Percentage of Current Residents Who Are URiM	264	0.23	0.00
Percentage of Current Residents Who Are DOs	264	-0.40	0.00
Percentage of Current Residents Who Are IMGs	264	-0.01	0.88
Orthopedic Surgery			
Number of Applicants	182	0.83	0.00
Number of Entering Residents	178	0.46	0.00
Percentage of Current Residents Who Are URiM	178	0.09	0.26
Percentage of Current Residents Who Are DOs	178	-0.22	0.00
Percentage of Current Residents Who Are IMGs	178	-0.07	0.36
Pediatrics			
Number of Applicants	200	0.71	0.00
Number of Entering Residents	194	0.75	0.00
Percentage of Current Residents Who Are URiM	194	-0.03	0.64
Percentage of Current Residents Who Are DOs	194	-0.40	0.00
Percentage of Current Residents Who Are IMGs	194	-0.12	0.10
Physical Medicine and Rehabilitation			
Number of Applicants	94	0.60	0.00
Number of Entering Residents	88	0.48	0.00
Percentage of Current Residents Who Are URiM	88	0.13	0.24
Percentage of Current Residents Who Are DOs	88	-0.19	0.08
Percentage of Current Residents Who Are IMGs	88	-0.20	0.07
Psychiatry			
Number of Applicants	255	0.79	0.00
Number of Entering Residents	240	0.69	0.00
Percentage of Current Residents Who Are URiM	240	0.03	0.68
Percentage of Current Residents Who Are DOs	240	-0.43	0.00
Percentage of Current Residents Who Are IMGs	240	-0.08	0.23

(continued)

Table 12. Correlation Between Program Characteristics and the Number of Signals Received, by Characteristic and Specialty, 2022-2023 *(continued)*

Specialty and Characteristic[1]	Number of Programs	Correlation Coefficient[2]	*P*-value
Public Health and General Preventive Medicine			
Number of Applicants	--	--	--
Number of Entering Residents	--	--	--
Percentage of Current Residents Who Are URiM	--	--	--
Percentage of Current Residents Who Are DOs	--	--	--
Percentage of Current Residents Who Are IMGs	--	--	--

1. Program setting (urban/rural) was not included in this analysis because data to classify programs were not available at the time of writing.

2. When evaluating effect size of correlations in the social sciences, less than 0.1 is not a practical effect, 0.10-0.29 is small, 0.30-0.49 is medium, and ≥0.50 is large.

3. Program characteristics unique to Emergency Medicine (program length, program accreditation date, and Centers for Medicare & Medicaid Services (CMS) status) were not included in this analysis because the data were not available at the time of writing.

4. This value due to rounding, and we do actually see a very small negative correlation.

5. Dashes indicate cells where data were excluded because there were fewer than 30 programs.

Table 13. Mean Number of Signals Received by Programs, by Institution Type and Specialty, 2022-2023

Specialty[1]	Community-Based			Community-Based and University-Affiliated			University-Based		
	Number of Programs	Mean Number of Signals Received (Per Program)	Standard Deviation	Number of Programs	Mean Number of Signals Received (Per Program)	Standard Deviation	Number of Programs	Mean Number of Signals Received (Per Program)	Standard Deviation
Adult Neurology	12	18.58	10.77	35	29.43	21.22	99	38.78	20.19
Anesthesiology	12	50.92	20.87	37	84.30	59.21	97	120.96	64.72
Dermatology	11	19.00	9.62	22	17.68	11.38	84	25.10	15.11
Diagnostic Radiology	16	39.00	13.41	63	49.98	26.71	101	76.11	38.93
Interventional Radiology	--[2]	--	--	15	7.33	4.17	65	13.37	9.44
Emergency Medicine	41	33.73	35.51	121	41.68	33.65	86	76.85	42.81
General Surgery	61	38.98	27.51	109	50.87	40.65	103	98.79	55.60
Internal Medicine - Categorical	111	109.33	85.68	252	199.63	163.51	120	344.30	212.93
Internal Medicine/Psychiatry	--	--	--	--	--	--	11	30.09	14.63
Neurological Surgery	--	--	--		30.05	20.25	77	28.23	18.49
Obstetrics and Gynecology	47	126.15	57.13	98	130.96	67.31	117	180.97	89.40
Orthopedic Surgery	21	189.90	48.09	56	205.73	87.62	99	280.83	86.41
Pediatrics	13	93.23	102.03	82	85.20	52.07	99	116.49	76.99
Physical Medicine and Rehabilitation	10	27.10	13.82	28	36.64	21.86	50	44.62	26.00
Psychiatry	43	44.70	29.28	86	51.95	37.47	113	84.75	48.52
Public Health and General Preventive Medicine	--	--	--	7	6.43	3.78	14	9.14	4.19

1. We conducted an ANOVA to explore differences in program signals received, by program setting. There were statistically significant differences for most specialties except for Dermatology ($F(2, 114) = 2.94$, $p = 0.06$); Neurological Surgery ($F(2, 98) = 1.05$, $p = 0.35$); and Physical Medicine and Rehabilitation ($F(2, 85) = 2.71$, $p = 0.07$). Internal Medicine/Psychiatry and Public Health and General Preventive Medicine were excluded from the analysis due to small sample size.

2. Dashes indicate cells with fewer than five observations.

Conclusions and Next Steps

These analyses show that program signals may add value to the residency selection process. Applicants were willing to indicate their program preferences, although for the second year, IMGs sent fewer signals compared with MD applicants. Of applicants who indicated a geographic preference, most of their program signals and geographic preferences were aligned and were more likely to be sent to programs located in the same U.S. census division as their permanent address. However, the U.S. census divisions used on the supplemental ERAS application were quite large, so more research is needed to better understand whether geographic preferences and program signals provide redundant information.

Results also showed that program signals were not distributed evenly across programs. In each specialty, 10% of programs received about 20%-30% of available signals. More research is needed to understand why those programs received more signals and whether program signals are of value to programs that receive signals from the bulk of their applicants and to programs that receive signals from a small number of their applicants.

Research planned for winter-spring 2023 includes exploring the relationship among program signals, available positions per program, and interview invitations using “selected to interview” status.

Reference

Cohen J. *Statistical Power Analysis for the Behavioral Sciences.* 2nd ed. Mahwah, NJ: Lawrence Erlbaum Associates; 1988.

Appendix A

Number and Percentage of Cross-Appliers, by Specialty, as of Oct. 3, 2022

Table A.1. Number of Applicants Who Applied in One Specialty or Multiple Participating Specialties as of Oct. 3, 2022, by Specialty

Specialty	Number of Applicants Who		
	Applied to and Signaled One Participating Specialty	Applied to and Signaled at Least Two Participating Specialties	Applied and Signaled
Adult Neurology	1,029	733	1,762
Anesthesiology	2,176	1,066	3,242
Dermatology	685	269	954
Diagnostic Radiology and Interventional Radiology[1]	1,264	916	2180
Emergency Medicine	2,219	581	2,800
General Surgery	2,822	927	3,749
Internal Medicine - Categorical	12,051	3,576	15,627
Internal Medicine/ Psychiatry[2]	--	--	196
Neurological Surgery	292	107	399
Obstetrics and Gynecology	1,941	393	2,334
Orthopedic Surgery	1,124	432	1,556

(continued)

Table A.1. Number of Applicants Who Applied in One Specialty or Multiple Participating Specialties as of Oct. 3, 2022, by Specialty *(continued)*

Specialty	Number of Applicants Who		
	Applied to and Signaled One Participating Specialty	Applied to and Signaled at Least Two Participating Specialties	Applied and Signaled
Pediatrics	3,164	945	4,109
Physical Medicine and Rehabilitation	615	320	935
Psychiatry	2,483	829	3,312
Public Health and General Preventive Medicine	27	62	89

1. Results for Diagnostic Radiology and Interventional Radiology were combined because they participated jointly.

2. Results for Internal Medicine/Psychiatry were redacted because of the small number of people who applied in only one specialty.

Appendix B

Number of Signals Applicants Sent, by Applicant Demographic Characteristics and Specialty

Table B.1. Mean Number of Signals Applicants Sent, by Applicant Race/Ethnicity and Specialty, 2022-2023

Specialty and Applicants' Race/Ethnicity	Number of Applicants	Mean Number of Signals Sent	Standard Deviation	Cohen *d*
Adult Neurology				
American Indian or Alaska Native	6	2.50	0.84	*[1]
Asian	742	2.99	0.13	-0.06
Black or African American	121	2.96	0.24	0.09
Hispanic, Latino, or of Spanish Origin	156	2.97	0.20	0.05
Native Hawaiian or Other Pacific Islander	--[2]	--	--	*
White Only[3]	567	2.98	0.18	
Other Race/Ethnicity	148	2.97	0.20	0.05
Multiple Race/Ethnicity[4]	144	2.97	0.16	0.06
Unknown Race/Ethnicity	46	2.98	0.15	0.00
Anesthesiology				
American Indian or Alaska Native	23	5.00	0.00	-0.16
Asian	943	4.98	0.22	-0.07
Black or African American	292	4.96	0.29	0.00
Hispanic, Latino, or of Spanish Origin	370	4.98	0.22	-0.07
Native Hawaiian or Other Pacific Islander	7	5.00	0.00	*
White Only	1,428	4.96	0.35	
Other Race/Ethnicity	208	4.91	0.54	0.11
Multiple Race/Ethnicity	335	4.96	0.34	0.00
Unknown Race/Ethnicity	69	5.00	0.00	-0.16
Dermatology				
American Indian or Alaska Native	9	3.00	0.00	*
Asian	266	2.97	0.23	0.00
Black or African American	109	3.00	0.00	-0.20
Hispanic, Latino, or of Spanish Origin	97	2.94	0.35	0.10
Native Hawaiian or Other Pacific Islander	5	3.00	0.00	*
White Only	390	2.97	0.21	
Other Race/Ethnicity	84	2.95	0.26	0.08
Multiple Race/Ethnicity	109	2.95	0.28	0.08
Unknown Race/Ethnicity	30	3.00	0.00	-0.20

(continued)

Table B.1. Mean Number of Signals Applicants Sent, by Applicant Race/Ethnicity and Specialty, 2022-2023 *(continued)*

Specialty and Applicants' Race/Ethnicity	Number of Applicants	Mean Number of Signals Sent	Standard Deviation	Cohen *d*
Diagnostic Radiology				
American Indian or Alaska Native	10	5.80	0.42	*
Asian	700	5.64	1	-0.02
Black or African American	130	5.60	1	0.02
Hispanic, Latino, or of Spanish Origin	185	5.54	1.20	0.07
Native Hawaiian or Other Pacific Islander	10	5.08	0.63	*
White Only	904	5.62	1.04	
Other Race/Ethnicity	149	5.64	0.95	-0.02
Multiple Race/Ethnicity	205	5.57	1.09	0.05
Unknown Race/Ethnicity	56	5.63	1.18	-0.01
Interventional Radiology				
American Indian or Alaska Native	--	--	--	*
Asian	84	3.69	1.91	-0.02
Black or African American	20	3.20	2.24	*
Hispanic, Latino, or of Spanish Origin	20	3.85	1.76	*
Native Hawaiian or Other Pacific Islander	--	--	--	*
White Only	125	3.66	1.81	
Other Race/Ethnicity	22	4.00	1.83	-0.19
Multiple Race/Ethnicity	26	4.04	1.80	-0.21
Unknown Race/Ethnicity	5	3.80	1.79	*
Emergency Medicine				
American Indian or Alaska Native	28	4.89	0.42	0.15
Asian	533	4.92	0.49	0.07
Black or African American	221	4.97	0.26	-0.06
Hispanic, Latino, or of Spanish Origin	305	4.92	0.48	0.07
Native Hawaiian or Other Pacific Islander	8	5.00	0.00	*
White Only	1,566	4.95	0.36	
Other Race/Ethnicity	168	4.95	0.38	0.00
Multiple Race/Ethnicity	303	4.96	0.33	-0.03
Unknown Race/Ethnicity	51	4.90	0.57	0.10

(continued)

Table B.1. Mean Number of Signals Applicants Sent, by Applicant Race/Ethnicity and Specialty, 2022-2023 *(continued)*

Specialty and Applicants' Race/Ethnicity	Number of Applicants	Mean Number of Signals Sent	Standard Deviation	Cohen *d*
General Surgery				
American Indian or Alaska Native	37	5.00	0.00	-0.19
Asian	933	4.94	0.44	0.02
Black or African American	344	4.99	0.11	-0.14
Hispanic, Latino, or of Spanish Origin	496	4.93	0.46	0.05
Native Hawaiian or Other Pacific Islander	13	4.69	1.11	*
White Only	1,688	4.95	0.38	
Other Race/Ethnicity	268	4.94	0.36	0.03
Multiple Race/Ethnicity	428	4.97	0.27	-0.06
Unknown Race/Ethnicity	90	4.91	0.53	0.09
Internal Medicine - Categorical				
American Indian or Alaska Native	55	6.69	1.18	0.17
Asian	7,171	6.92	0.52	-0.09
Black or African American	1,553	6.88	0.60	-0.03
Hispanic, Latino, or of Spanish Origin	1,500	6.83	0.75	0.04
Native Hawaiian or Other Pacific Islander	24	6.83	0.64	0.04
White Only	4,153	6.86	0.73	
Other Race/Ethnicity	1,128	6.88	0.63	-0.03
Multiple Race/Ethnicity	1,111	6.83	0.78	0.04
Unknown Race/Ethnicity	352	6.89	0.60	-0.04
Internal Medicine/Psychiatry				
American Indian or Alaska Native	--	--	--	*
Asian	52	1.96	0.19	0.19
Black or African American	26	1.96	0.20	0.18
Hispanic, Latino, or of Spanish Origin	21	1.90	0.30	0.39
Native Hawaiian or Other Pacific Islander	--	--	--	*
White Only	74	1.99	0.12	
Other Race/Ethnicity	14	2.00	0.00	*
Multiple Race/Ethnicity	11	1.91	0.30	*
Unknown Race/Ethnicity	10	2.00	0.00	*

(continued)

Table B.1. Mean Number of Signals Applicants Sent, by Applicant Race/Ethnicity and Specialty, 2022-2023 *(continued)*

Specialty and Applicants' Race/Ethnicity	Number of Applicants	Mean Number of Signals Sent	Standard Deviation	Cohen *d*
Neurological Surgery				
American Indian or Alaska Native	--	--	--	*
Asian	107	7.96	0.39	-0.26
Black or African American	40	8.00	0.00	-0.32
Hispanic, Latino, or of Spanish Origin	52	8.00	0.00	-0.32
Native Hawaiian or Other Pacific Islander	--	--	--	*
White Only	156	7.72	1.25	
Other Race/Ethnicity	31	7.84	0.90	-0.11
Multiple Race/Ethnicity	43	7.88	0.76	-0.15
Unknown Race/Ethnicity	16	8.00	0.00	*
Obstetrics and Gynecology				
American Indian or Alaska Native	21	17.86	0.36	-0.12
Asian	480	17.55	2.23	0.07
Black or African American	326	17.66	1.66	0.02
Hispanic, Latino, or of Spanish Origin	309	17.48	2.27	0.11
Native Hawaiian or Other Pacific Islander	5	18.00	0.00	*
White Only	1,100	17.70	1.85	
Other Race/Ethnicity	116	17.69	1.42	0.01
Multiple Race/Ethnicity	254	17.72	1.43	-0.01
Unknown Race/Ethnicity	31	17.90	0.54	-0.15
Orthopedic Surgery				
American Indian or Alaska Native	15	28.60	5.15	*
Asian	297	28.06	5.21	0.02
Black or African American	127	28.48	5.54	0.05
Hispanic, Latino, or of Spanish Origin	137	27.35	6.87	0.23
Native Hawaiian or Other Pacific Islander	6	30.00	0.00	*
White Only	910	28.72	4.71	
Other Race/Ethnicity	80	28.16	6.05	0.10
Multiple Race/Ethnicity	141	27.94	6.44	0.14
Unknown Race/Ethnicity	28	29.93	0.26	-0.36

(continued)

Table B.1. Mean Number of Signals Applicants Sent, by Applicant Race/Ethnicity and Specialty, 2022-2023 *(continued)*

Specialty and Applicants' Race/Ethnicity	Number of Applicants	Mean Number of Signals Sent	Standard Deviation	Cohen *d*
Pediatrics				
American Indian or Alaska Native	27	4.48	1.22	0.49
Asian	1,311	4.95	0.40	-0.05
Black or African American	386	4.94	0.43	-0.02
Hispanic, Latino, or of Spanish Origin	481	4.91	0.52	0.04
Native Hawaiian or Other Pacific Islander	5	5.00	0.00	*
White Only	1,693	4.93	0.46	
Other Race/Ethnicity	223	4.93	0.45	0.00
Multiple Race/Ethnicity	368	4.87	0.63	0.11
Unknown Race/Ethnicity	78	4.94	0.41	-0.02
Physical Medicine and Rehabilitation				
American Indian or Alaska Native	6	4.00	0.00	*
Asian	295	3.98	0.22	-0.04
Black or African American	84	4.00	0.00	-0.16
Hispanic, Latino, or of Spanish Origin	107	3.90	0.49	0.18
Native Hawaiian or Other Pacific Islander	--	--	--	*
White Only	391	3.97	0.27	
Other Race/Ethnicity	59	3.92	0.47	0.13
Multiple Race/Ethnicity	101	3.92	0.46	0.13
Unknown Race/Ethnicity	18	3.89	0.47	*
Public Health and General Preventive Medicine				
American Indian or Alaska Native	--	--	--	*
Asian	38	2.74	0.60	-0.39
Black or African American	14	2.86	0.36	*
Hispanic, Latino, or of Spanish Origin	8	2.75	0.71	*
Native Hawaiian or Other Pacific Islander	--	--	--	*
White Only	24	2.46	0.83	
Other Race/Ethnicity	5	2.60	0.89	*
Multiple Race/Ethnicity	7	2.43	0.98	*
Unknown Race/Ethnicity	--	--	--	*

(continued)

Table B.1. Mean Number of Signals Applicants Sent, by Applicant Race/Ethnicity and Specialty, 2022-2023 *(continued)*

Specialty and Applicants' Race/Ethnicity	Number of Applicants	Mean Number of Signals Sent	Standard Deviation	Cohen *d*
Psychiatry				
American Indian or Alaska Native	30	4.83	0.53	0.23
Asian	1,187	4.95	0.39	-0.03
Black or African American	399	4.93	0.41	0.02
Hispanic, Latino, or of Spanish Origin	363	4.92	0.46	0.05
Native Hawaiian or Other Pacific Islander	9	5.00	0.00	*
White Only	1,142	4.94	0.40	
Other Race/Ethnicity	214	4.92	0.51	0.04
Multiple Race/Ethnicity	322	4.93	0.43	0.02
Unknown Race/Ethnicity	77	4.94	0.41	0.00

1. Asterisks indicate cells where Cohen d was not computed because there were fewer than 20 observations per group.

2. Dashes indicate cells with fewer than five observations.

3. "White Only" includes applicants who selected only White as their race/ethnicity category.

4. "Multiple Race/Ethnicity" includes applicants who selected more than one race/ethnicity category.

Table B.2. Mean Number of Signals, by Applicant Gender and Specialty, 2022-2023

Specialty and Gender	Number of Applicants	Mean Number of Signals	Standard Deviation	Cohen *d*
Adult Neurology				
Man	940	2.98	0.15	
Woman	820	2.98	0.20	0.00
Another gender identity	--[1]	--	--	*[2]
Declined to answer	--	--	--	*
Anesthesiology				
Man	2,117	4.97	0.28	
Woman	1,119	4.95	0.37	0.06
Another gender identity	--	--	--	*
Declined to answer	--	--	--	*
Dermatology				
Man	312	2.98	0.18	
Woman	642	2.97	0.23	0.05
Another gender identity	--	--	--	*
Declined to answer	--	--	--	*
Diagnostic Radiology				
Man	1,546	5.62	1.03	
Woman	551	5.63	1.02	-0.01
Another gender identity	--	--	--	*
Declined to answer	--	--	--	*
Interventional Radiology				
Man	214	3.62	1.88	
Woman	60	3.85	1.81	-0.12
Another gender identity	--	--	--	*
Declined to answer	--	--	--	*
Emergency Medicine				
Man	1,589	4.93	0.46	
Woman	1,195	4.96	0.31	-0.08
Another gender identity	15	5	0.00	*
Declined to answer	--	--	--	*
General Surgery				
Man	2,002	4.95	0.39	
Woman	1,736	4.95	0.41	0.00
Another gender identity	11	4.73	0.90	*
Declined to answer	--	--	--	*

(continued)

Table B.2. Mean Number of Signals, by Applicant Gender and Specialty, 2022-2023 *(continued)*

Specialty and Gender	Number of Applicants	Mean Number of Signals	Standard Deviation	Cohen *d*
Internal Medicine (Categorical)				
Man	8,376	6.88	0.65	
Woman	7,240	6.90	0.59	-0.03
Another gender identity	7	6.86	0.38	*
Declined to answer	--	--	--	*
Internal Medicine/Psychiatry				
Man	94	1.96	0.20	
Woman	99	1.98	0.14	-0.12
Another gender identity	--	--	--	*
Declined to answer	--	--	--	--
Neurological Surgery				
Man	284	7.84	0.92	
Woman	114	7.94	0.66	-0.12
Another gender identity	--	--	--	*
Declined to answer	--	--	--	*
Obstetrics and Gynecology				
Man	306	17.25	2.78	
Woman	2,016	17.70	1.78	-0.19
Another gender identity	11	17.91	0.30	*
Declined to answer	--	--	--	*
Orthopedic Surgery				
Man	1,214	28.51	5.20	
Woman	342	28.82	4.71	-0.06
Another gender identity	--	--	--	*
Declined to answer	--	--	--	*
Pediatrics				
Man	1,144	4.91	0.52	
Woman	2,956	4.94	0.43	-0.06
Another gender identity	9	5	0.00	*
Declined to answer	--	--	--	*
Physical Medicine and Rehabilitation				
Man	625	3.97	0.28	
Woman	307	3.96	0.28	0.04
Another gender identity	--	--	--	*
Declined to answer	--	--	--	*

(continued)

Table B.2. Mean Number of Signals, by Applicant Gender and Specialty, 2022-2023 *(continued)*

Specialty and Gender	Number of Applicants	Mean Number of Signals	Standard Deviation	Cohen *d*
Public Health and General Preventive Medicine				
Man	49	2.65	0.72	
Woman	40	2.75	0.54	-0.16
Another gender identity	--	--	--	--
Declined to answer	--	--	--	--
Psychiatry				
Man	1,579	4.93	0.42	
Woman	1,706	4.94	0.41	-0.02
Another gender identity	23	4.87	0.46	0.14
Declined to answer	--	--	--	*

1. Dashes indicate cells with fewer than five observations.

2. Asterisks indicate cells where Cohen *d* was not computed because there were fewer than 20 observations per group.

Table B.3. Mean Number of Signals, by Applicant Type and Specialty, 2022-2023

Specialty and Applicant Type	Number of Applicants	Mean Number of Signals	Standard Deviation	Cohen *d*
Adult Neurology				
MD	662	2.98	0.14	
IMG	853	2.98	0.19	0.00
DO	247	2.98	0.19	0.00
Anesthesiology				
MD	2023	4.97	0.27	
IMG	553	4.93	0.45	0.11
DO	666	4.97	0.30	0.00
Dermatology				
MD	733	2.97	0.23	
IMG	91	2.96	0.25	0.04
DO	130	2.99	0.09	-0.11
Diagnostic Radiology				
MD	1,334	5.65	1.02	
IMG	406	5.57	1.02	0.08
DO	358	5.58	1.04	0.07
Interventional Radiology				
MD	186	4.09	1.87	
IMG	43	2.77	1.56	0.77
DO	45	2.80	1.49	0.76
Emergency Medicine				
MD	1,417	4.97	0.29	
IMG	526	4.87	0.61	0.21
DO	857	4.94	0.40	0.09
General Surgery				
MD	2,017	4.96	0.37	
IMG	1,125	4.92	0.48	0.09
DO	607	4.96	0.32	0.00
Internal Medicine - Categorical				
MD	4,456	6.90	0.59	
IMG	8,878	6.88	0.64	0.03
DO	2,293	6.89	0.62	0.02

(continued)

Table B.3. Mean Number of Signals, by Applicant Type and Specialty, 2022-2023 *(continued)*

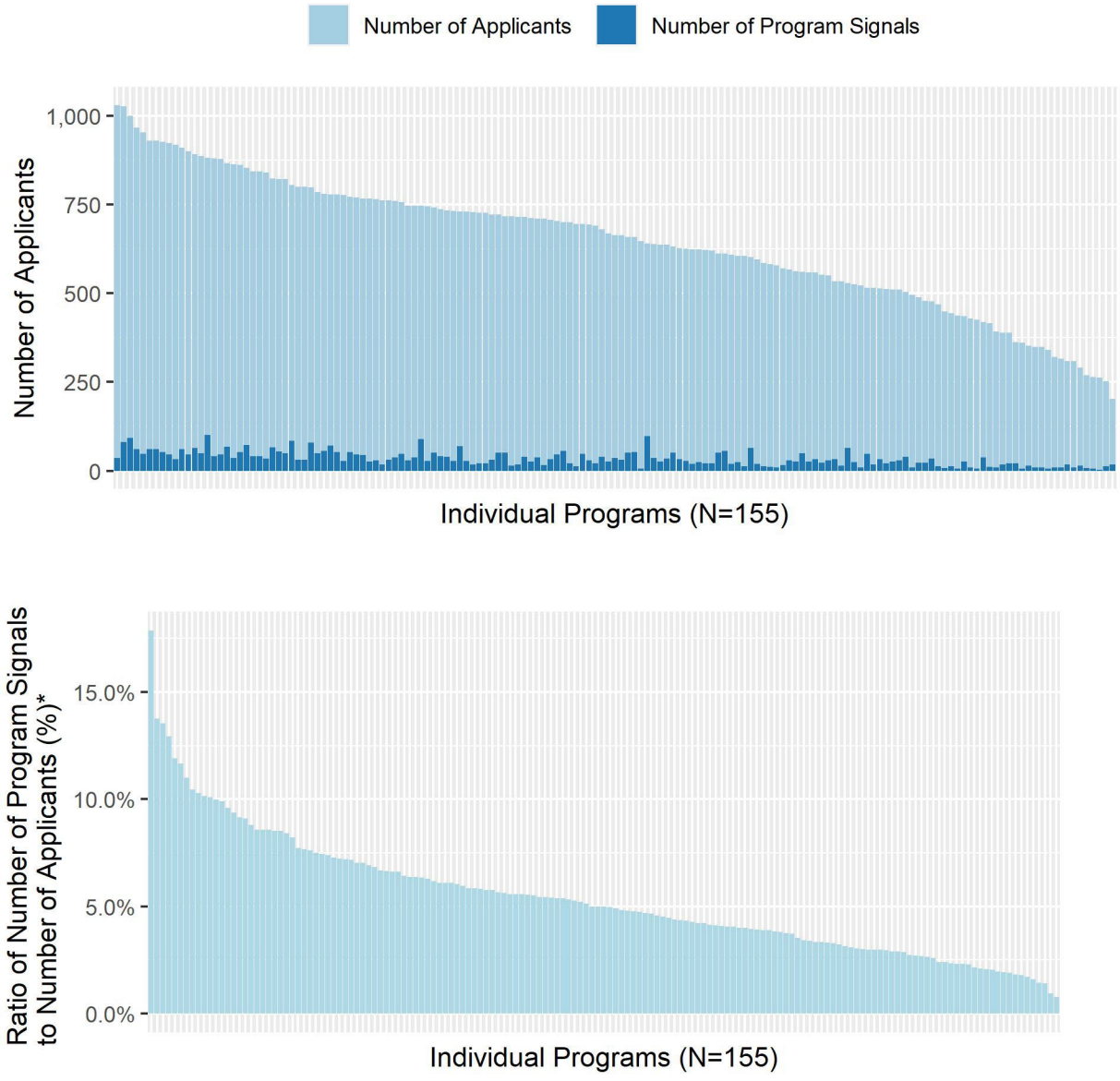
Specialty and Applicant Type	Number of Applicants	Mean Number of Signals	Standard Deviation	Cohen *d*
Internal Medicine/Psychiatry				
MD	80	1.96	0.19	
IMG	98	1.98	0.14	-0.12
DO	18	1.94	0.24	*[1]
Neurological Surgery				
MD	311	7.90	0.79	
IMG	71	7.82	0.98	0.09
DO	17	7.59	1.28	*
Obstetrics and Gynecology				
MD	1415	17.90	0.85	
IMG	469	16.83	3.42	0.43
DO	450	17.65	2.06	0.16
Orthopedic Surgery				
MD	1,174	29.17	3.95	
IMG	92	25.17	8.75	0.59
DO	290	27.25	6.74	0.35
Pediatrics				
MD	1,902	4.93	0.46	
IMG	1,459	4.92	0.48	0.02
DO	748	4.94	0.40	-0.02
Physical Medicine and Rehabilitation				
MD	421	3.97	0.23	
IMG	162	3.93	0.40	0.12
DO	352	3.97	0.26	0.00
Public Health and General Preventive Medicine				
MD	22	2.59	0.73	
IMG	59	2.71	0.64	-0.17
DO	8	2.88	0.35	*
Psychiatry				
MD	1,653	4.97	0.29	
IMG	1,031	4.88	0.57	0.20
DO	628	4.94	0.39	0.09

1. Asterisks indicate cells where Cohen *d* was not computed because there were fewer than 20 observations per group.

Appendix C

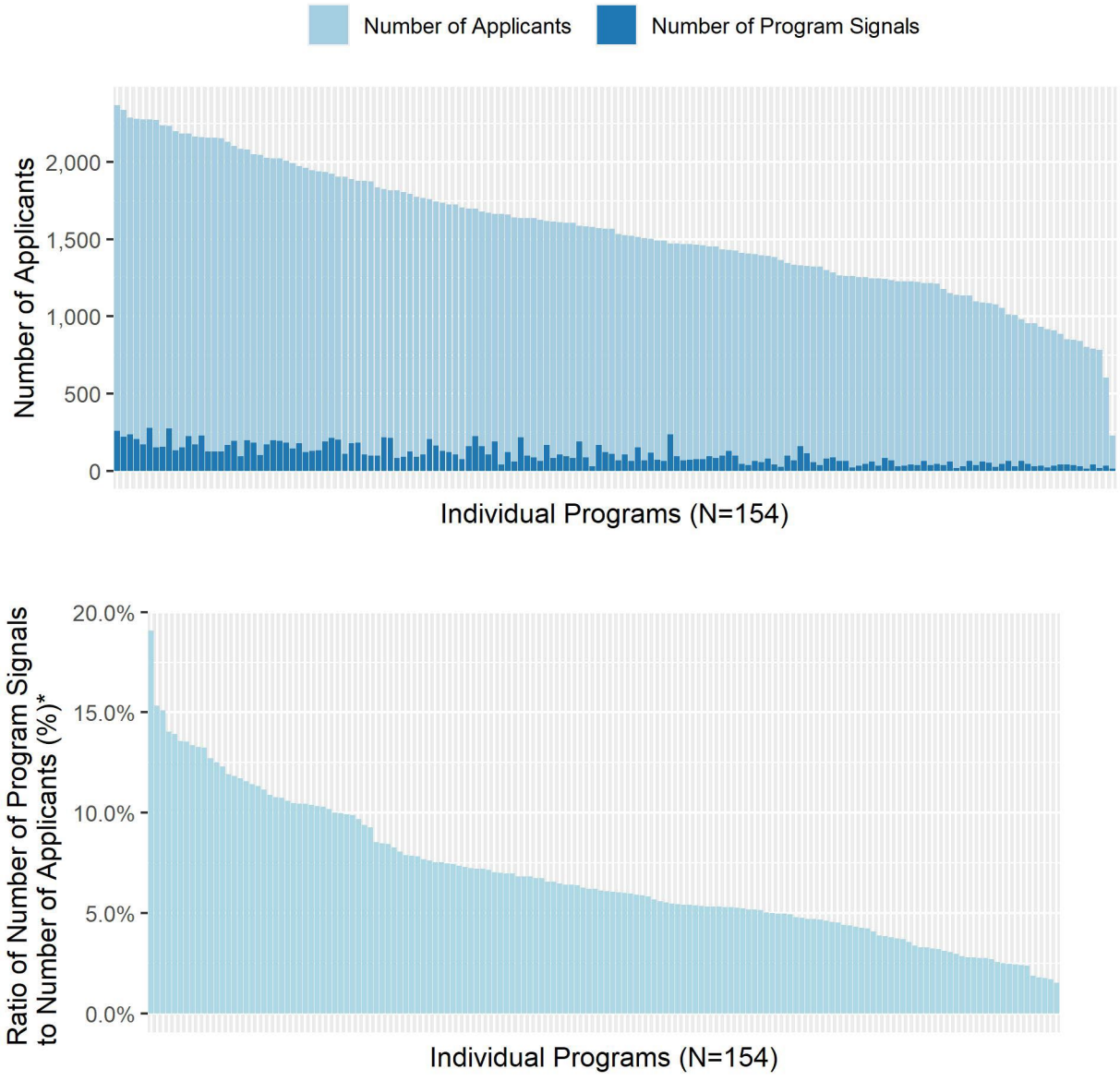
Distribution of Program Signals Adjusted for Application Volume, by Specialty, 2022-2023

C.1. Distribution of adjusted program signals for Adult Neurology, 2022-2023.



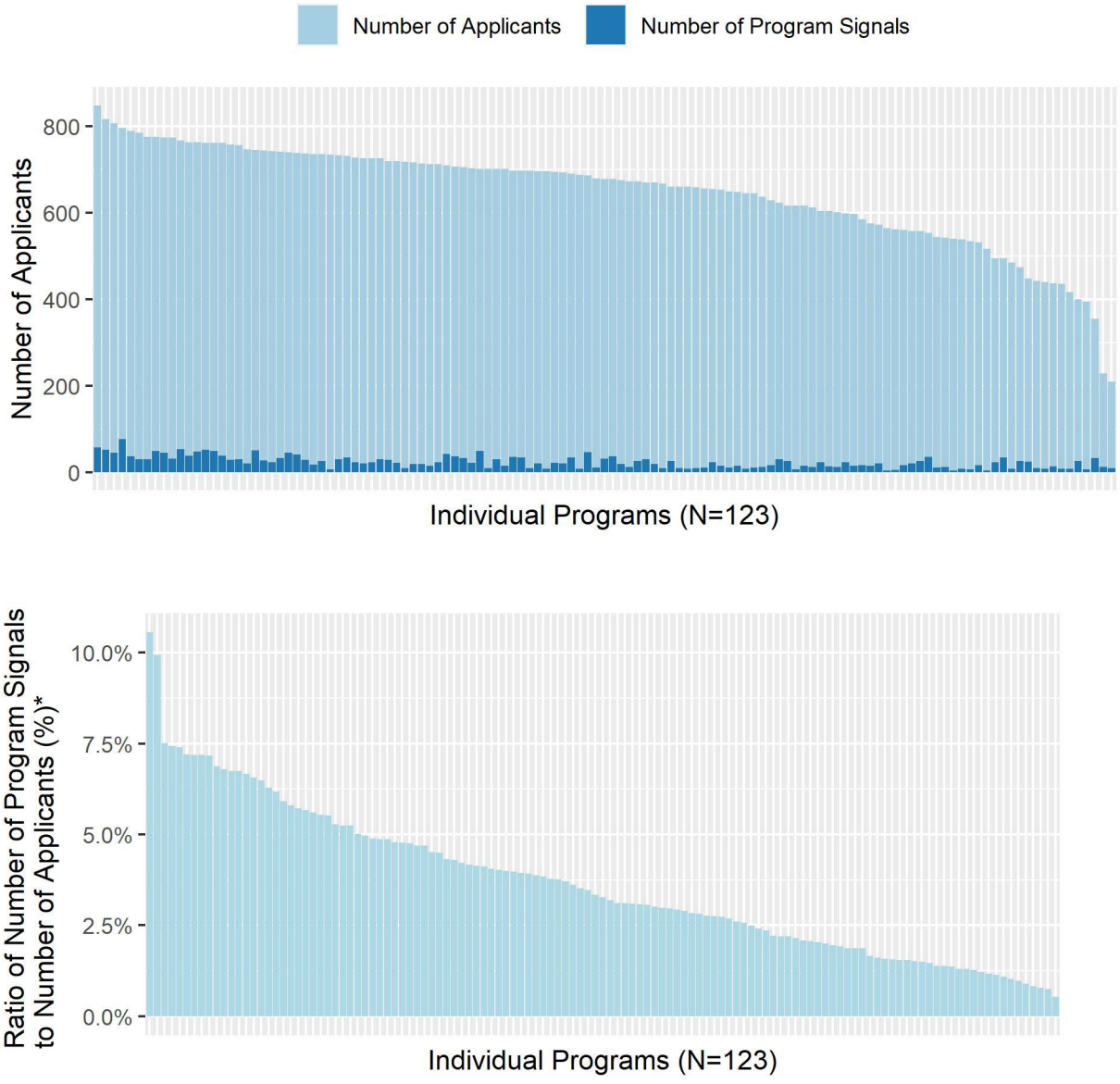
*Ratio of the total number of program signals a program received to the total number of applications a program received.

C.2. Distribution of adjusted program signals for Anesthesiology, 2022-2023.



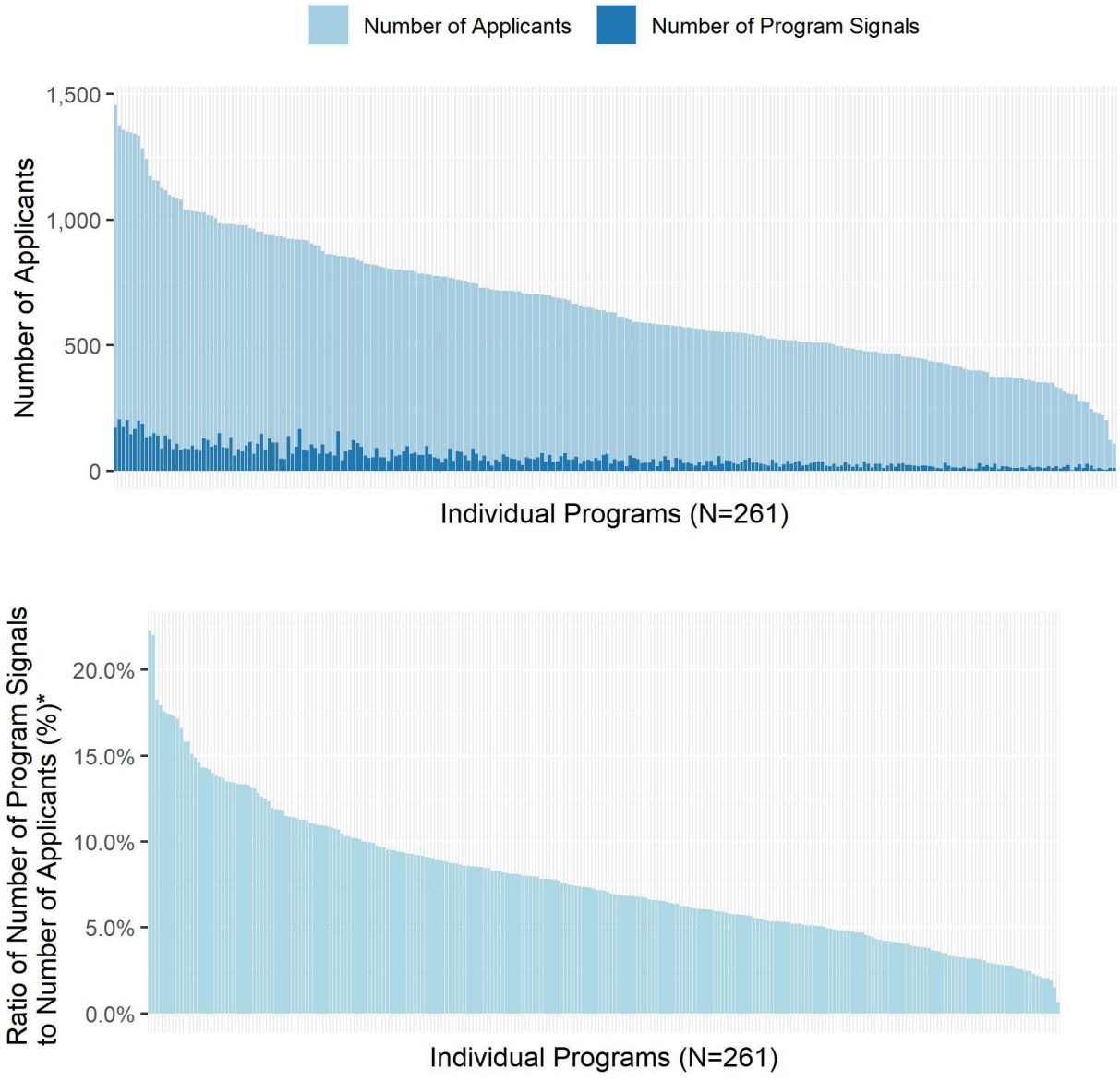
*Ratio of percentage of total program signals a program received to the total applications a program received.

C.3. Distribution of adjusted program signals for Dermatology, 2022-2023.



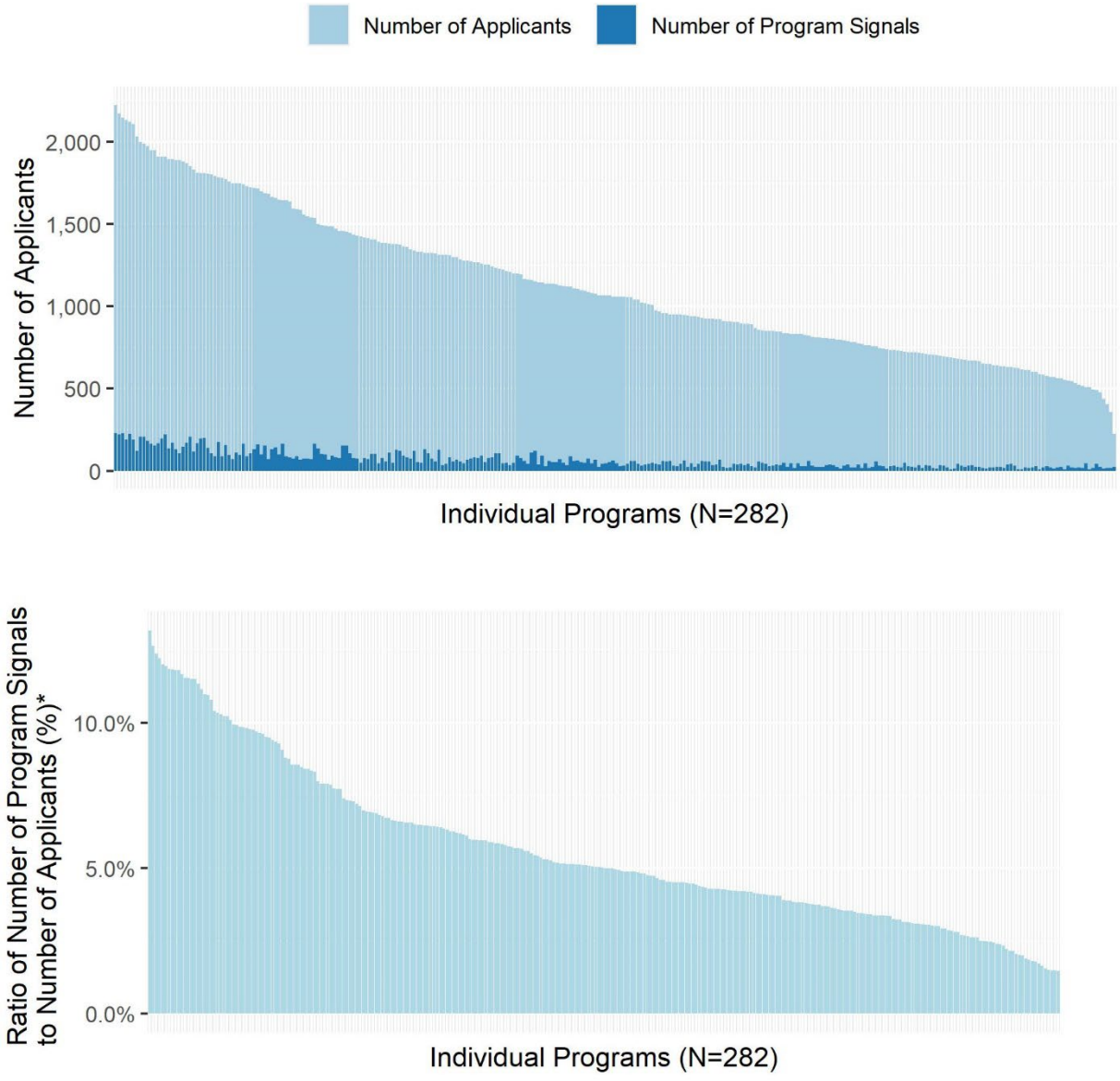
*Ratio of percentage of total program signals a program received to the total applications a program received.

C.4. Distribution of adjusted program signals for Emergency Medicine, 2022-2023.



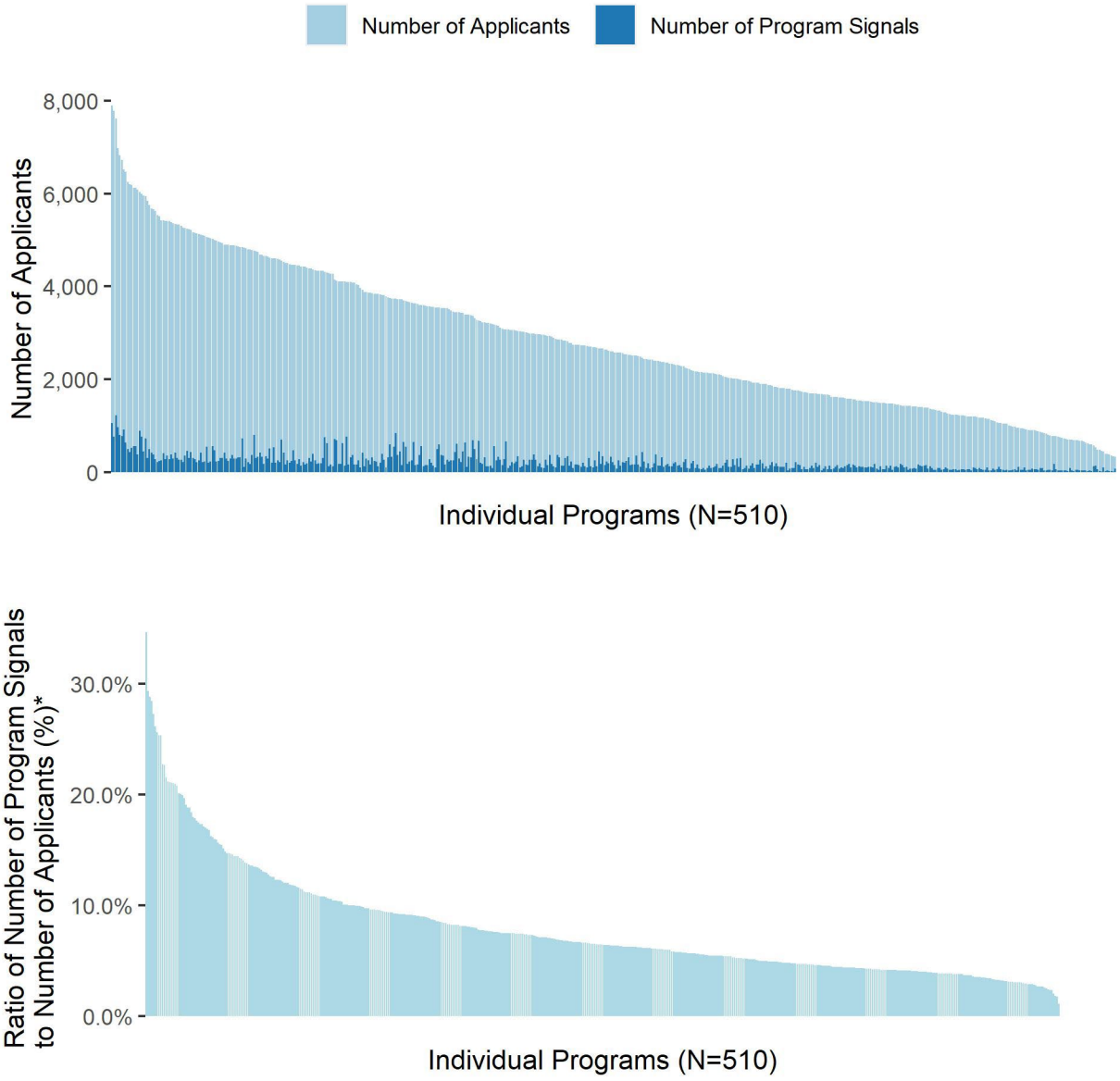
*Ratio of percentage of total program signals a program received to the total applications a program received.

C.5. Distribution of adjusted program signals for General Surgery, 2022-2023.



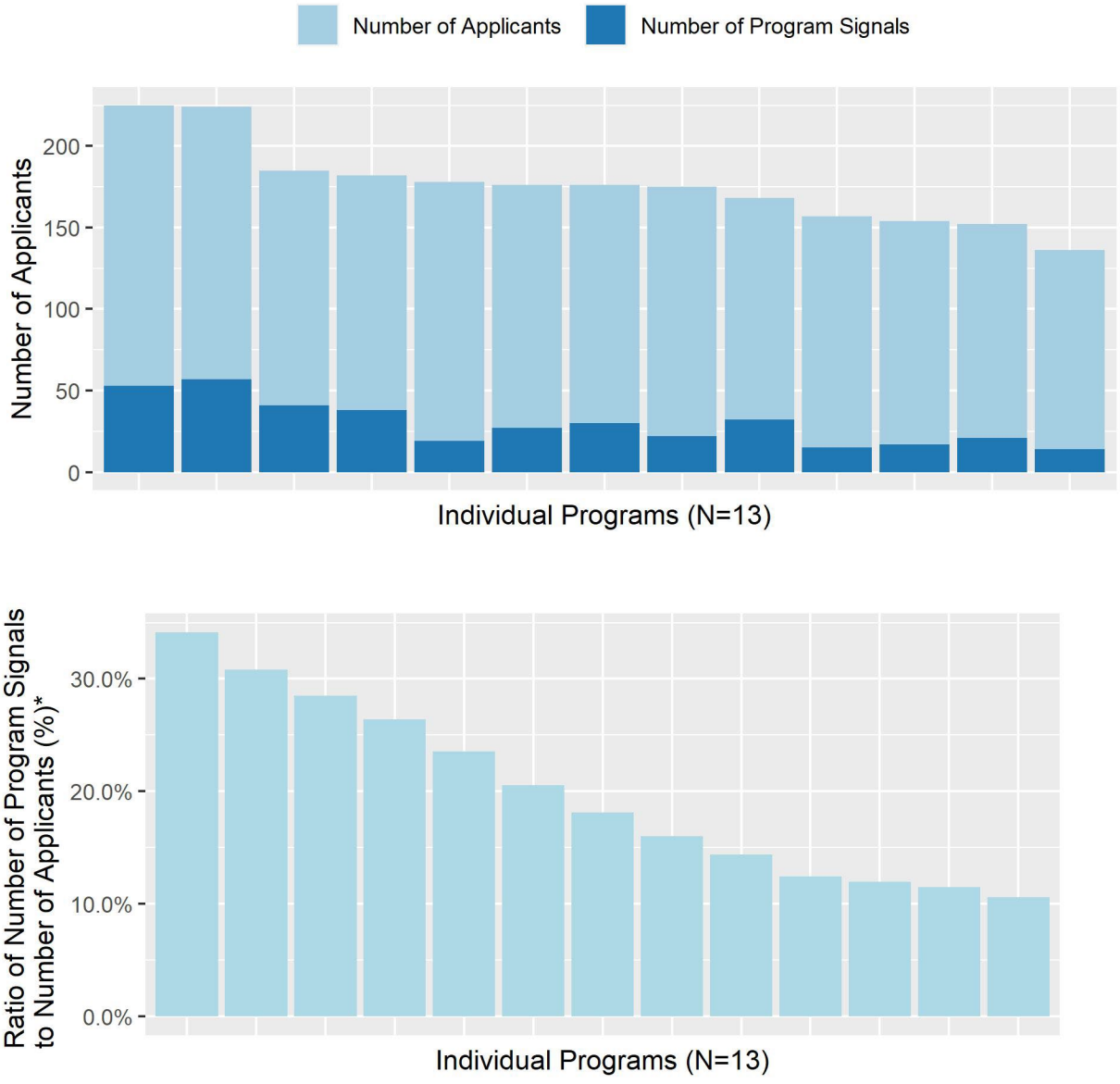
*Ratio of percentage of total program signals a program received to the total applications a program received.

C.6. Distribution of adjusted program signals for Internal Medicine - Categorical, 2022-2023.



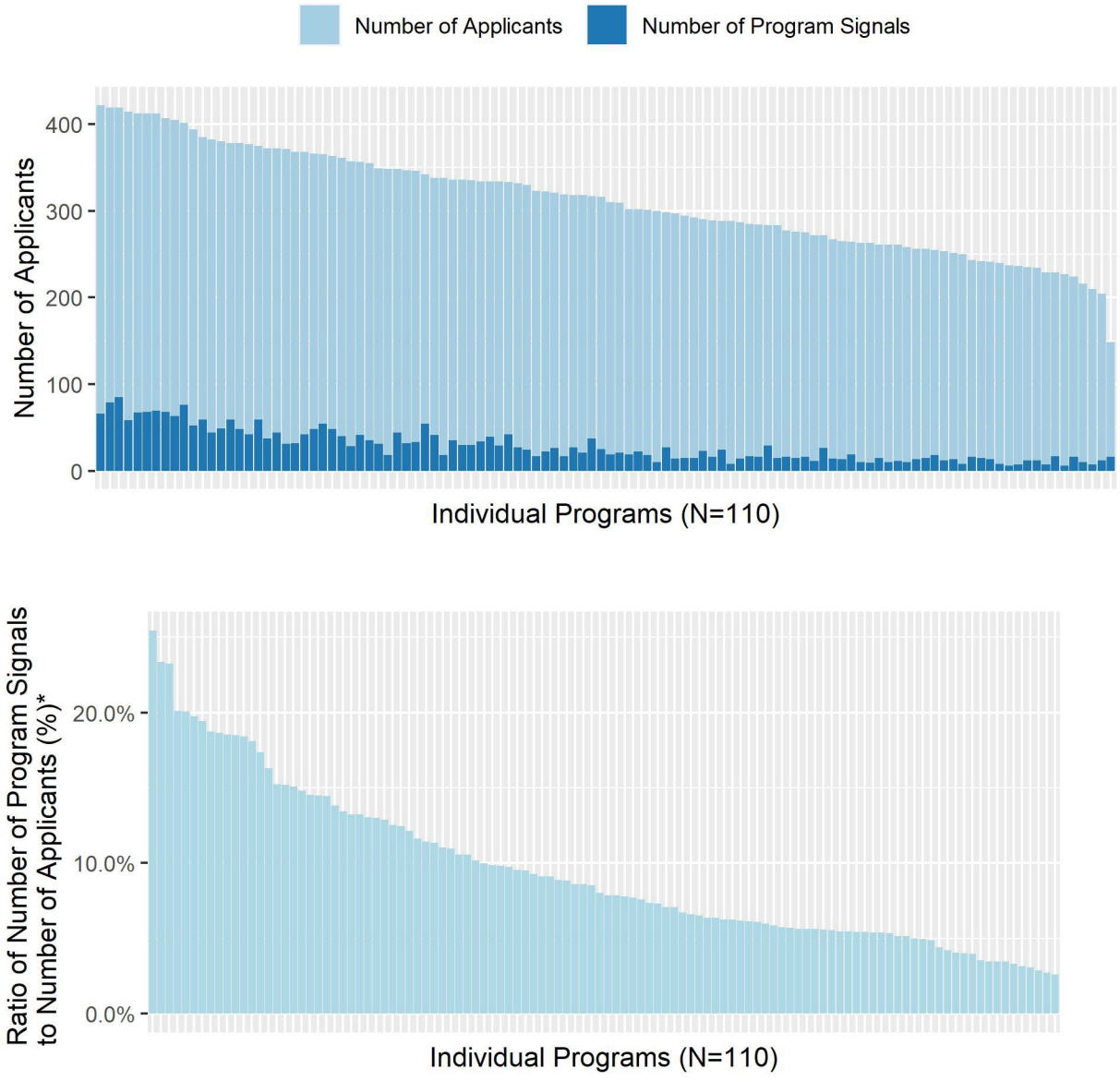
*Ratio of percentage of total program signals a program received to the total applications a program received.

C.7. Distribution of adjusted program signals for Internal Medicine/Psychiatry, 2022-2023.



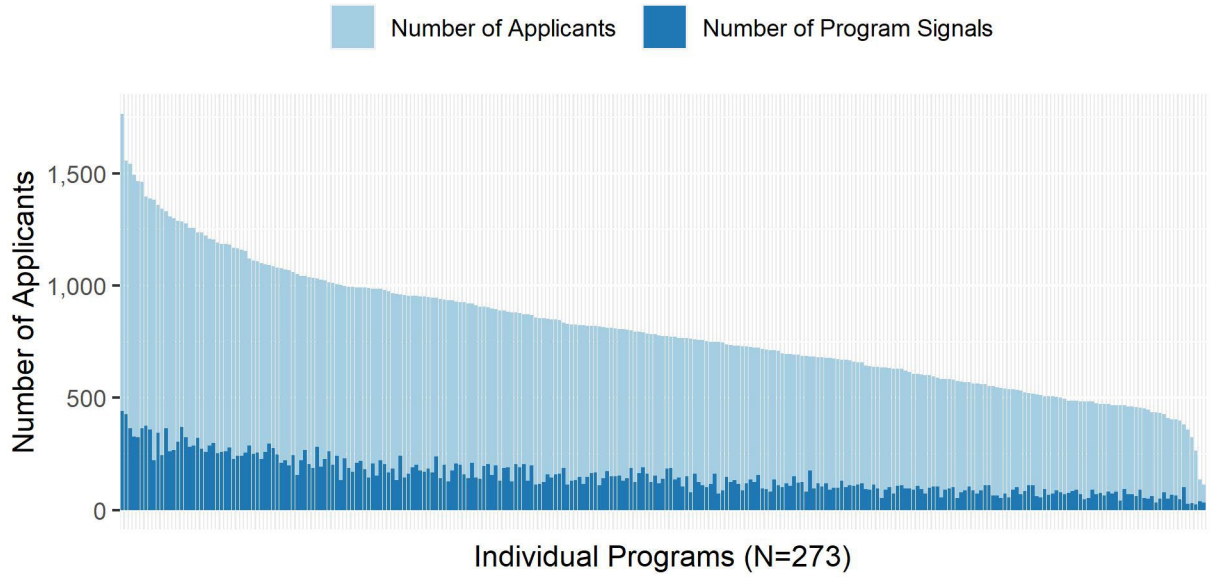
*Ratio of percentage of total program signals a program received to the total applications a program received.

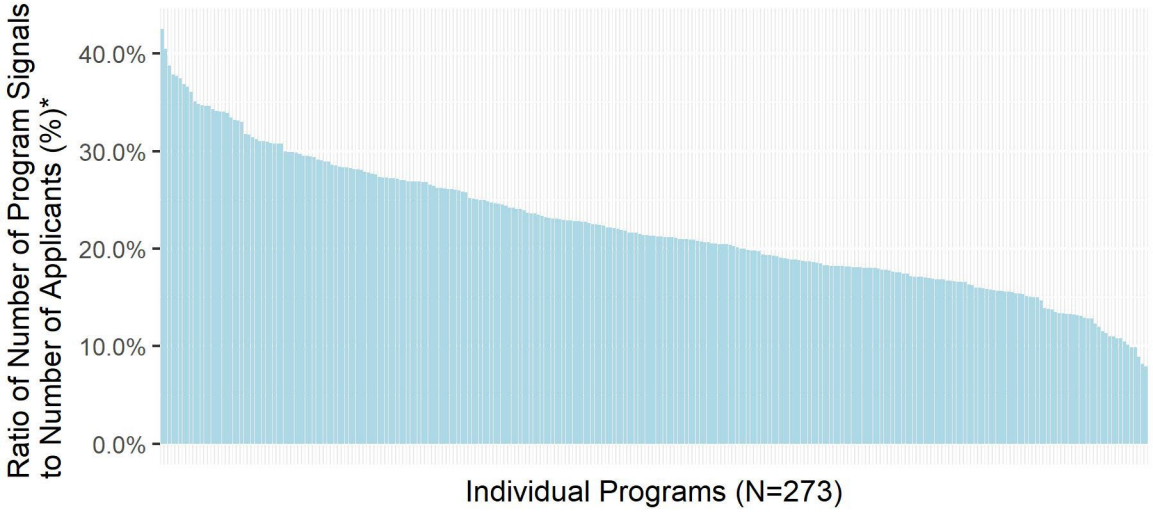
C.8. Distribution of adjusted program signals for Neurological Surgery, 2022-2023.



*Ratio of percentage of total program signals a program received to the total applications a program received.

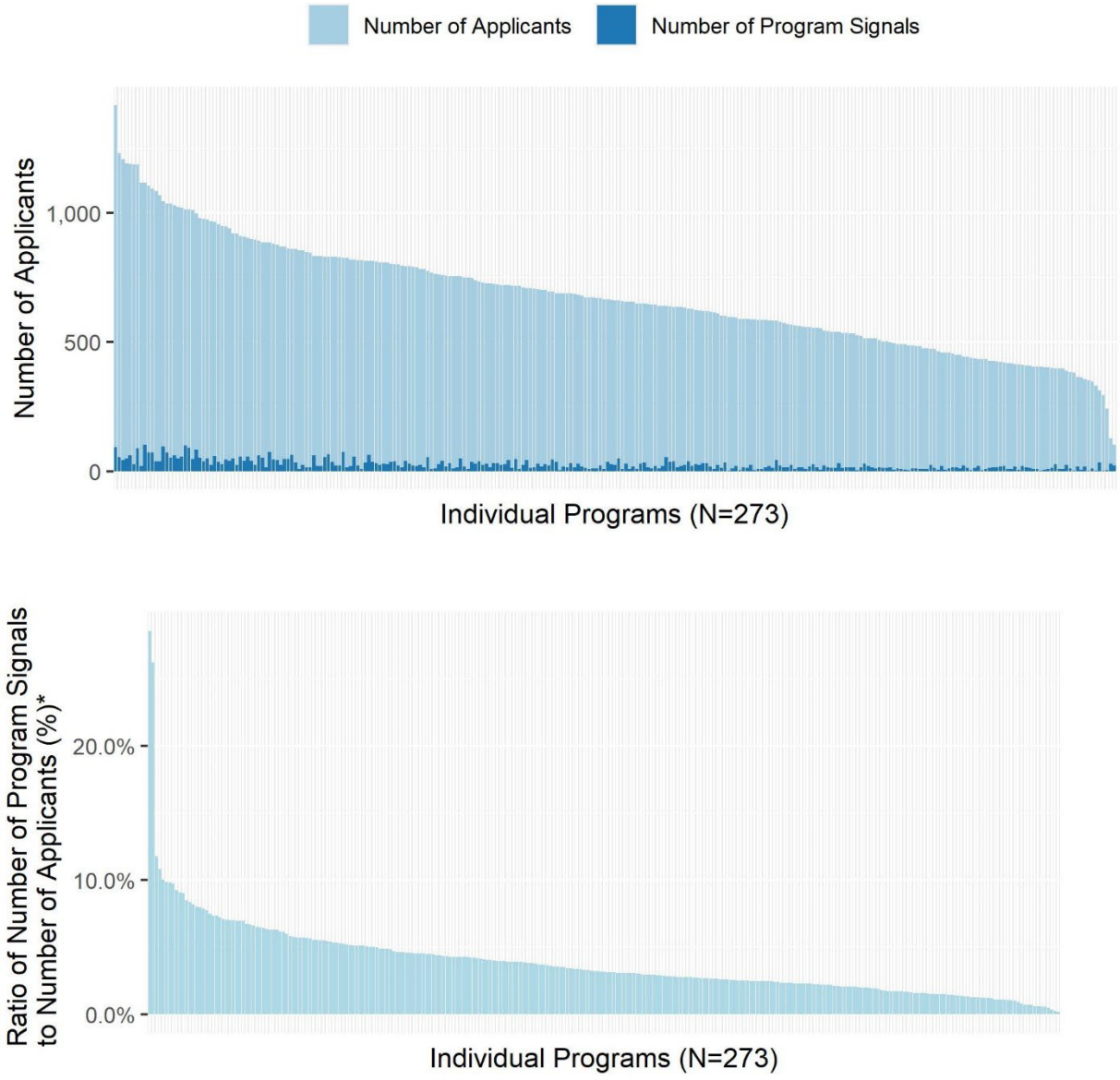
C.9. Distribution of adjusted program signals (Gold and Silver) for Obstetrics and Gynecology, 2022-2023.





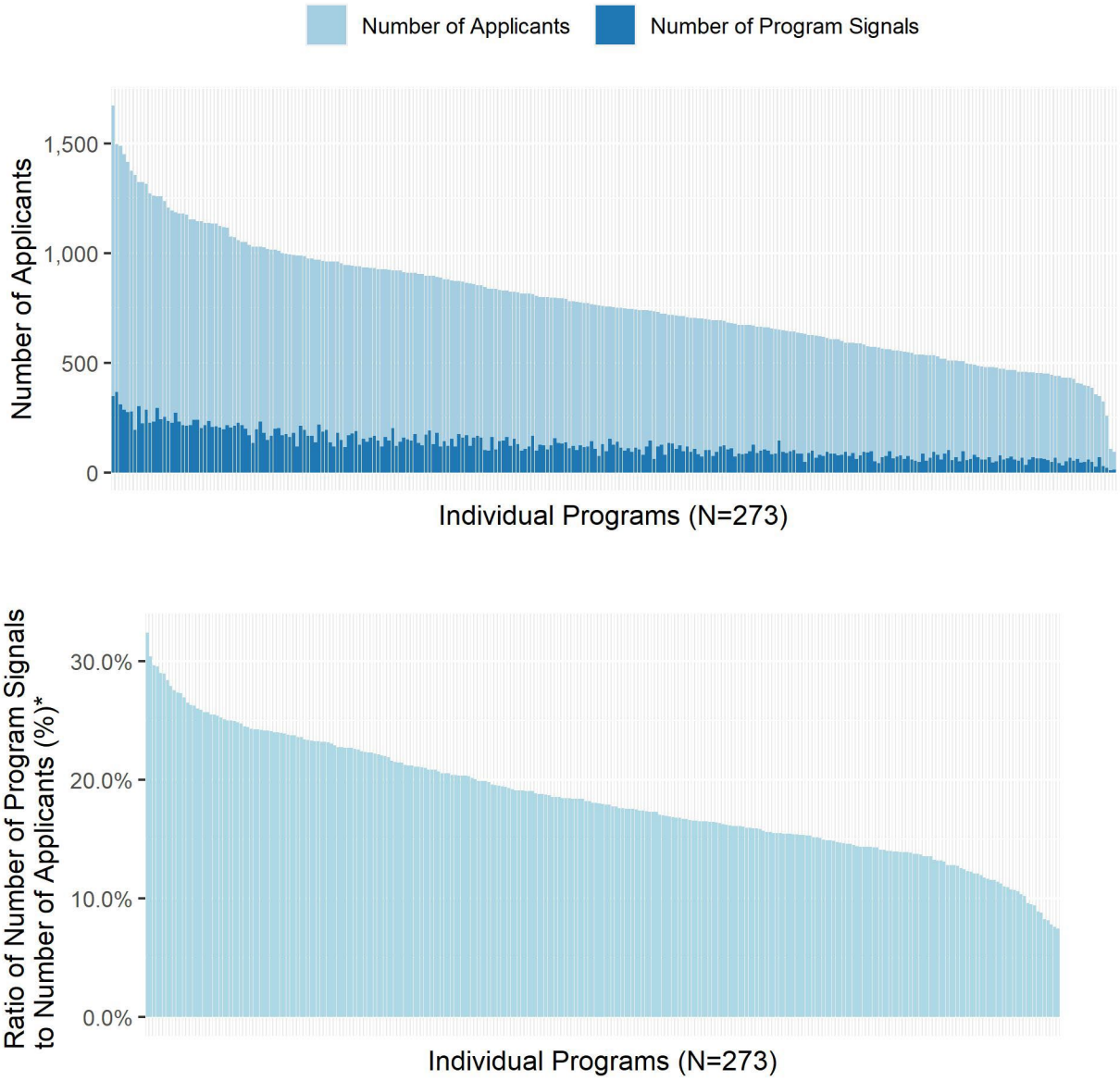
*Ratio of percentage of total Gold and Silver program signals a program received to the total applications a program received.

C.10. Distribution of adjusted Gold program signals for Obstetrics and Gynecology, 2022-2023.



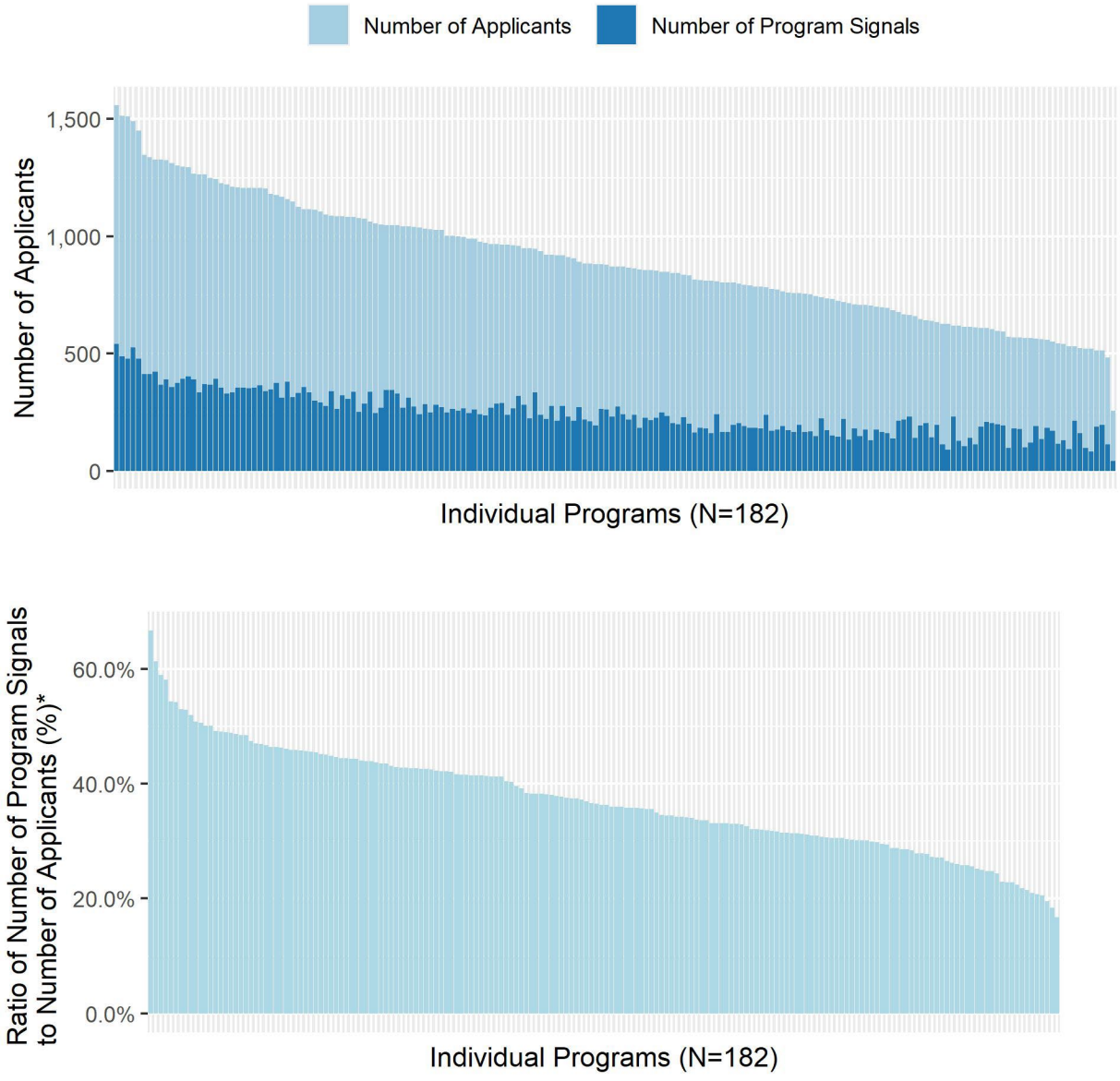
*Ratio of percentage of total Gold program signals a program received to the total applications a program received.

C.11. Distribution of adjusted Silver program signals for Obstetrics and Gynecology, 2022-2023.



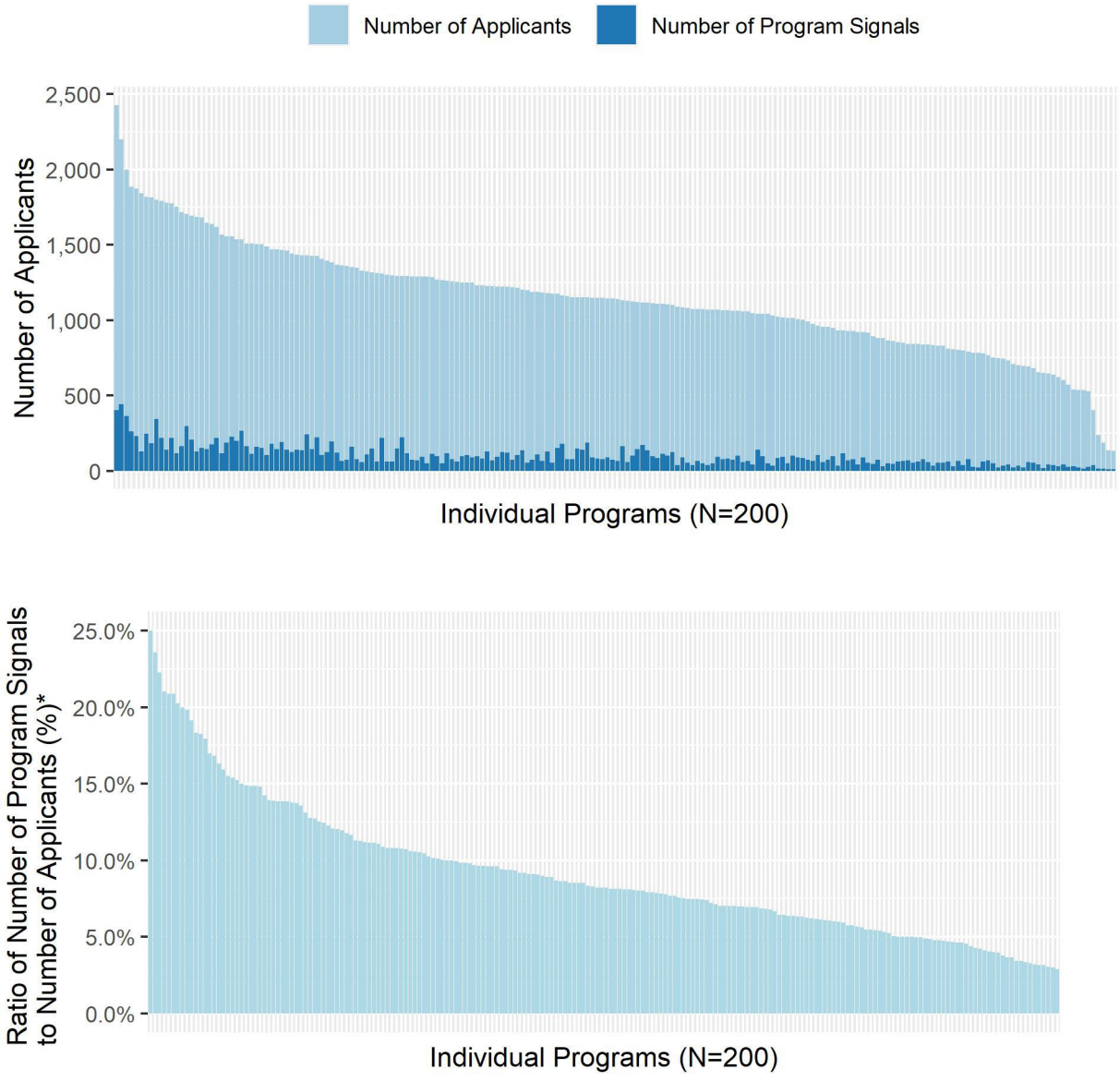
*Ratio of percentage of total Silver program signals a program received to the total applications a program received.

C.12. Distribution of adjusted program signals for Orthopedic Surgery, 2022-2023.



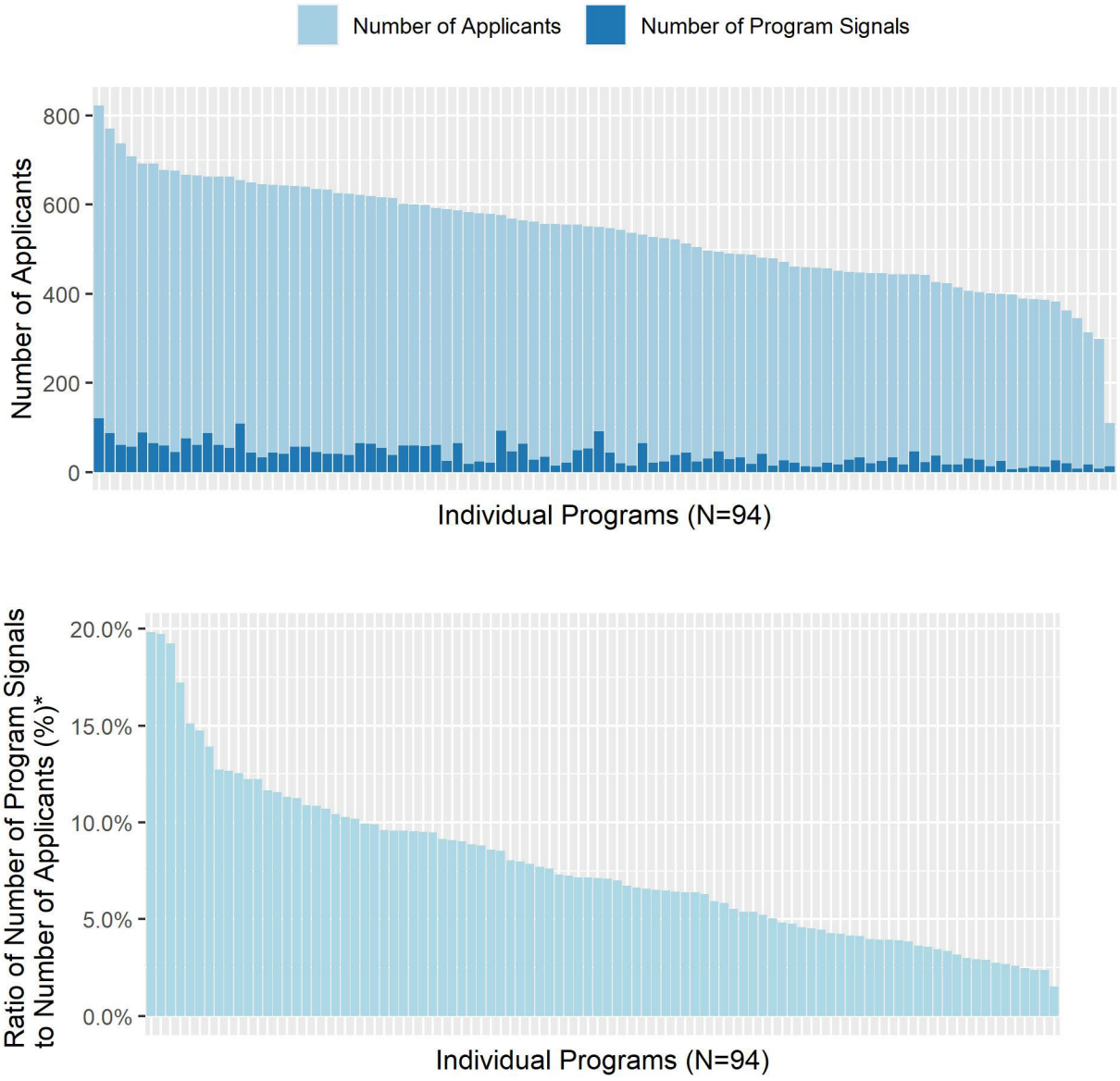
*Ratio of percentage of total program signals a program received to the total applications a program received.

C.13. Distribution of adjusted program signals for Pediatrics, 2022-2023.



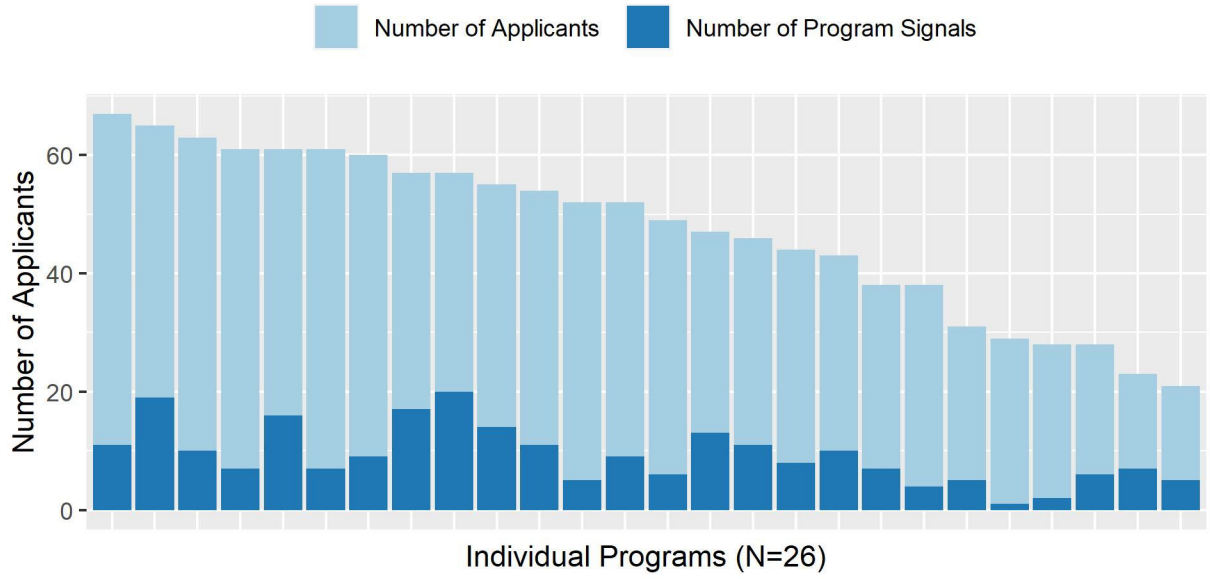
*Ratio of percentage of total program signals a program received to the total applications a program received.

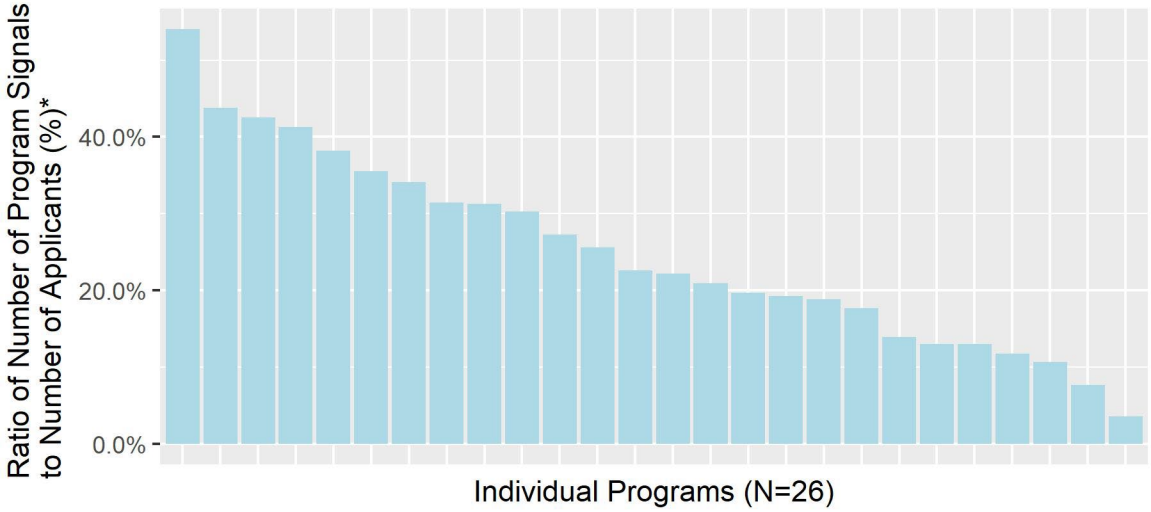
C.14. Distribution of adjusted program signals for Physical Medicine and Rehabilitation, 2022-2023.



*Ratio of percentage of total program signals a program received to the total applications a program received.

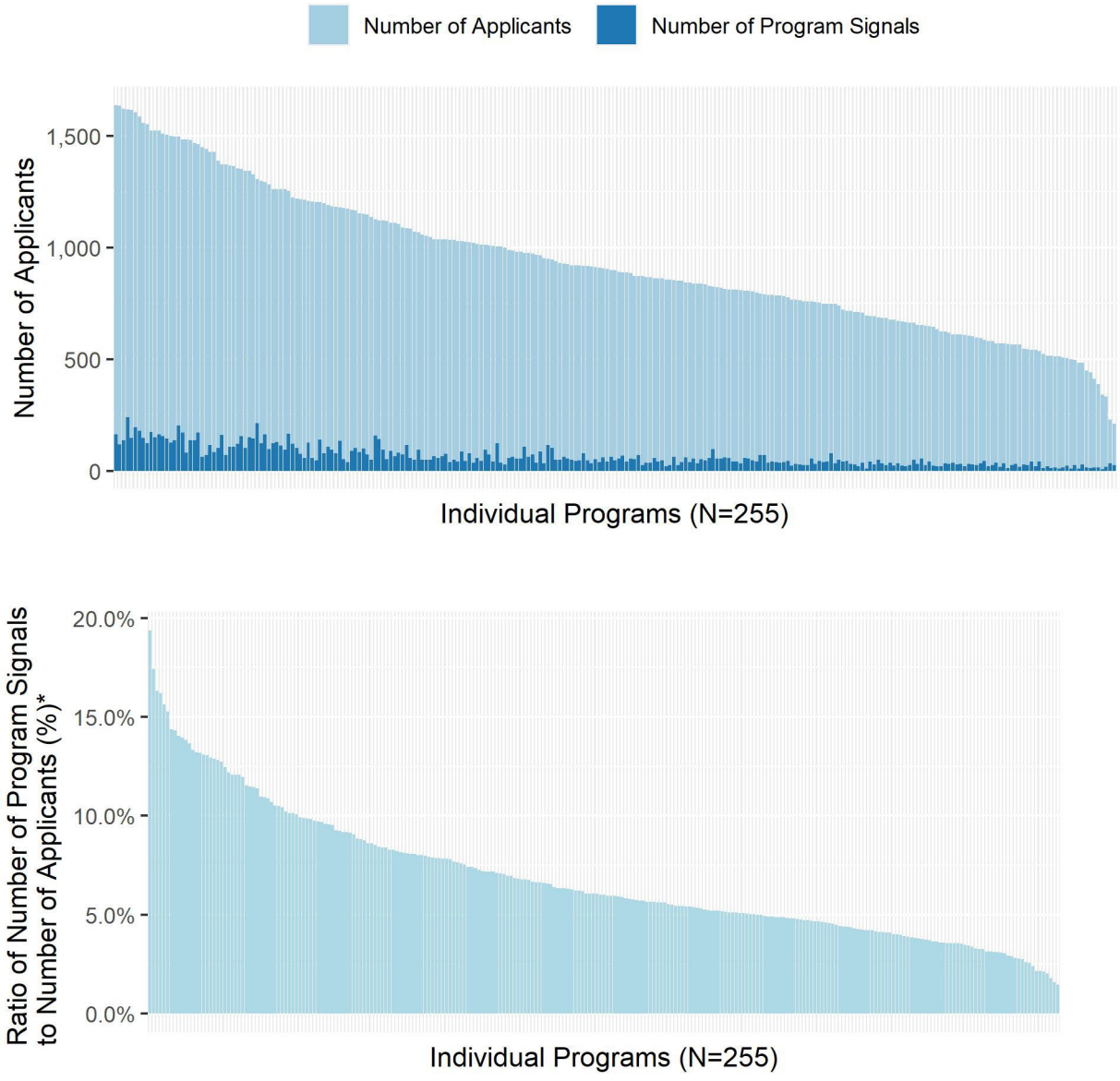
C.15. Distribution of adjusted program signals for Public Health and General Preventive Medicine, 2022-2023.





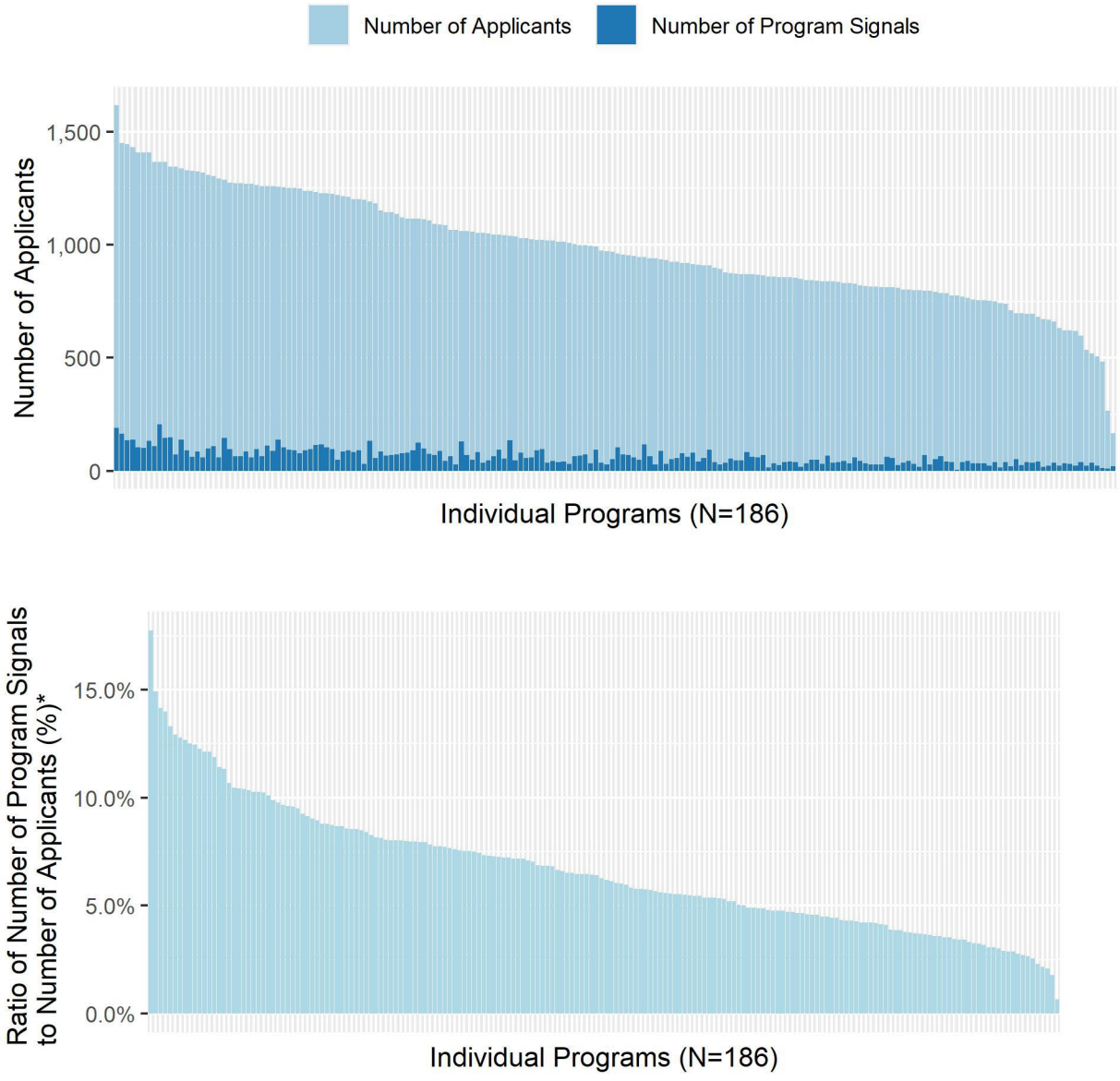
*Ratio of percentage of total program signals a program received to the total applications a program received.

C.16. Distribution of adjusted program signals for Psychiatry, 2022-2023.



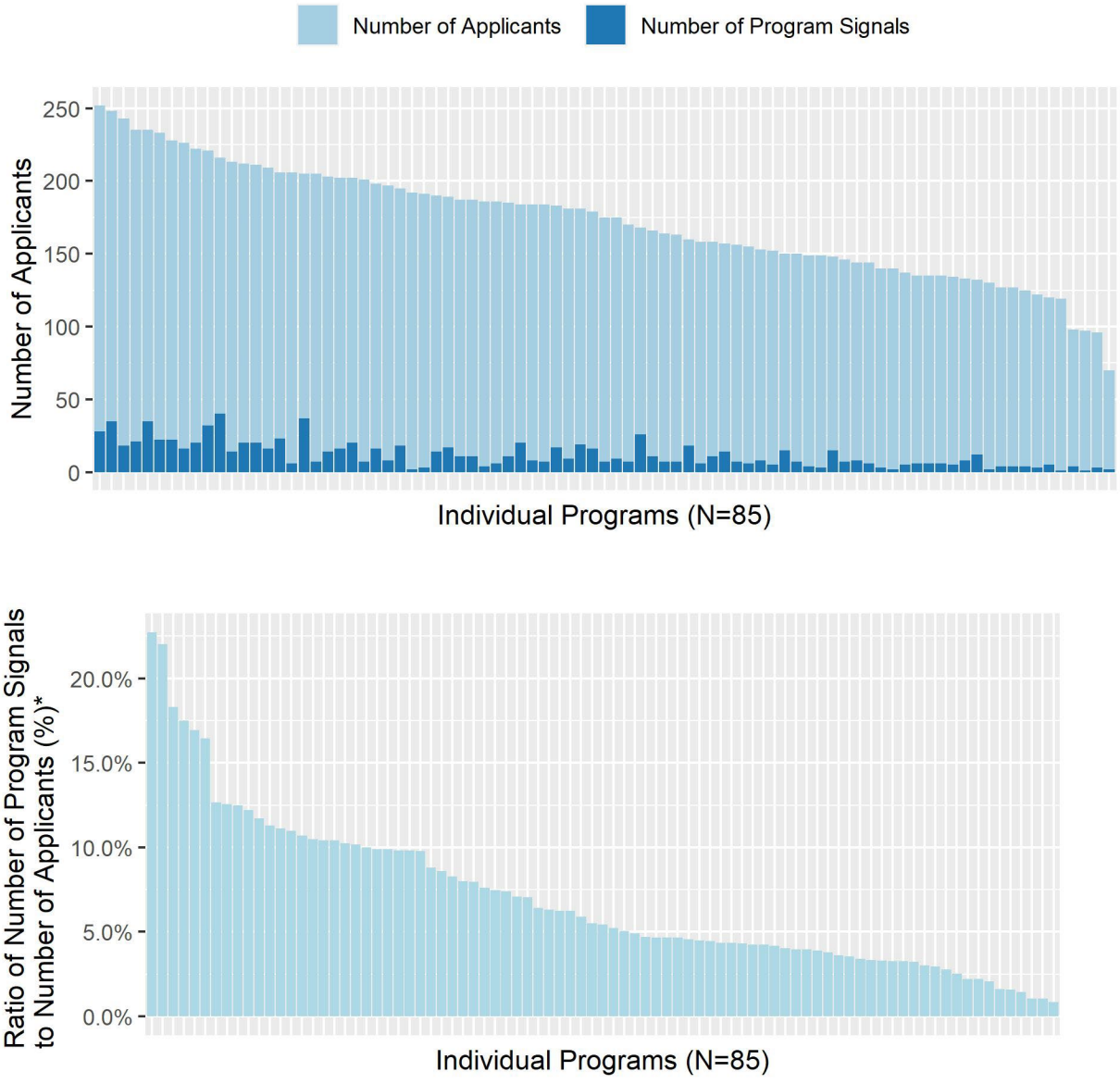
*Ratio of percentage of total program signals a program received to the total applications a program received.

C.17. Distribution of adjusted program signals for Diagnostic Radiology, 2022-2023.



*Ratio of percentage of total program signals a program received to the total applications a program received.

C.18. Distribution of adjusted program signals for Interventional Radiology, 2022-2023.



*Ratio of percentage of total program signals a program received to the total applications a program received.