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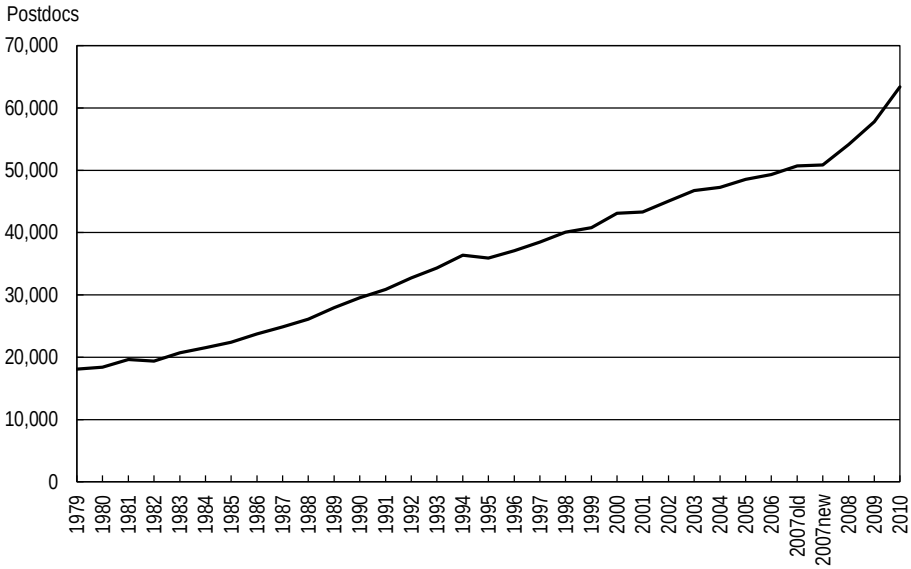
Counts of Postdoctoral Appointees in Science, Engineering, and Health Rise with Reporting Improvements

by Peter Einaudi, Ruth Heuer, and Patricia Green[1]

The total number of postdoctoral appointees (postdocs) reported in the 2010 Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS) grew to 63,415 in 2010, an increase of 10% over the 2009 total and 25% over the 2007 total. These 1- and 3-year growth rates are the highest in the history of the GSS and likely reflect improved reporting, as well as the continued expansion of postdoc employment in academia.

This InfoBrief assesses the impact of methodological changes to the GSS to reduce known reporting problems on the postdoc counts reported. Because the methodological changes began in 2007, analyses gauging the impact of the changes are based on the growth since 2006. As seen in figure 1, the number of postdocs reported in the GSS has climbed steadily over the duration of the survey, with a marked increase from 2007 through 2010. The results of this examination suggest that the 2010 postdoc data are the most accurate and comprehensive to date and that aggregate trends by discipline and demographics were largely unaffected by recent changes in reporting.

FIGURE 1. Postdocs in science, engineering, and health: 1979–2010



NOTES: In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. "2007new" presents data as collected in 2007; "2007old" shows data as they would have been collected in prior years. See "Data Source and Limitations" for more detail.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

Key Trends: 1979–2010

Postdoc Employment by Discipline

The GSS has collected data on postdocs annually since 1979. These data are widely used to estimate the trends seen in postdoc employment over the past 30 years. The dominant trend seen over this period has been the expansion of postdoc employment within and across disciplines (table 1). Because of the extra variability that may have resulted

TABLE 1. Postdocs in science, engineering, and health, by field: 1979–2010

Field	1979	1980	1990	2000	2006	2007 old[a]	2007 new[a]	2008	2009	2010	Percent change[b] 1979–2010	1980–90	1990–2000	2000–10	2007new–10	2009–10
All surveyed fields	18,101	18,399	29,565	43,115	49,343	50,712	50,840	54,164	57,805	63,415	245	60.7	45.8	45	25	10
Science and engineering	13,586	14,023	21,803	30,224	34,887	35,894	36,223	38,203	40,804	44,051	215	55.5	38.6	45	20	10
Science	12,519	13,042	19,853	26,911	30,245	30,986	31,281	32,741	34,388	37,095	185	52.0	35.6	40	20	10
Agricultural sciences	228	259	536	822	927	948	985	1,147	1,083	1,195	360	106.9	53.4	45	20	10
Biological sciences	6,866	7,083	11,909	16,734	18,807	19,218	19,109	19,827	20,159	21,537	205	68.1	40.5	30	15	5
Communication[a]	ne	ne	ne	ne	ne	ne	30	32	38	60	-	-	-	-	100	60
Computer sciences	38	43	71	344	467	516	456	493	594	748	1,640	65.1	384.5	115	65	25
Earth, atmospheric, and ocean sciences	315	312	594	1,155	1,495	1,322	1,250	1,339	1,424	1,760	465	90.4	94.4	50	40	25
Family and consumer sciences/ human sciences[a]	ne	ne	ne	ne	ne	ne	8	19	22	30	-	-	-	-	275	35
Mathematical sciences	162	162	249	385	579	621	624	723	737	756	365	53.7	54.6	95	20	5
Multidisciplinary/interdisciplinary studies[a]	ne	ne	ne	ne	ne	ne	244	348	459	765	-	-	-	-	215	65
Neuroscience[a]	na	na	na	na	na	na	285	343	645	818	-	-	-	-	185	25
Physical sciences	4,056	4,279	5,592	6,270	6,703	6,760	6,719	6,885	7,447	7,703	80	30.7	12.1	25	15	5
Psychology	454	475	464	730	873	1,106	1,088	1,077	1,219	1,077	125	-2.3	57.3	50	0	-10
Social sciences	400	429	438	471	394	495	483	508	561	646	50	2.1	7.5	35	35	15
Engineering	1,067	981	1,950	3,313	4,642	4,908	4,942	5,462	6,416	6,956	610	98.8	69.9	110	40	10
Aerospace engineering	32	20	67	111	165	178	178	154	168	191	855	235.0	65.7	70	5	15
Agricultural engineering	29	13	34	56	116	139	139	135	110	119	815	161.5	64.7	115	-15	10
Architecture[a]	na	na	na	na	na	na	5	11	22	10	-	-	-	-	100	-55
Biomedical engineering	28	25	71	220	591	640	640	710	960	1,036	4,045	184.0	209.9	370	60	10
Chemical engineering	192	185	557	703	735	758	790	880	1,084	1,092	490	201.1	26.2	55	40	0
Civil engineering[a]	128	122	168	295	458	419	417	465	535	570	365	37.7	75.6	95	35	5
Electrical engineering	142	123	242	525	721	885	884	987	1,025	1,097	790	96.7	116.9	110	25	5
Engineering science	74	79	76	163	224	192	183	214	226	243	210	-3.8	114.5	50	35	10
Industrial engineering	8	16	6	48	51	73	71	115	109	163	920	-62.5	700.0	240	130	50
Mechanical engineering	143	137	222	480	644	725	722	784	948	1,009	635	62.0	116.2	110	40	5
Metallurgical/materials engineering	209	172	363	507	571	555	564	605	758	835	385	111.0	39.7	65	50	10
Mining engineering	5	3	19	8	11	4	5	5	4	6	100	533.3	-57.9	-25	20	50
Nuclear engineering	20	22	30	40	85	77	73	85	90	107	385	36.4	33.3	170	45	20
Petroleum engineering	6	6	15	20	18	22	22	28	36	46	665	150.0	33.3	130	110	30
Engineering, nec	51	58	80	137	252	241	249	284	341	432	645	37.9	71.3	215	75	25
Health	4,515	4,376	7,762	12,891	14,456	14,818	14,617	15,961	17,001	19,364	345	77.4	66.1	50	30	15
Clinical medicine[a]	4,035	3,899	6,945	11,555	12,584	12,805	12,472	13,837	14,601	16,610	325	78.1	66.4	45	35	15
Other health	480	477	817	1,336	1,872	2,013	2,145	2,124	2,400	2,754	475	71.3	63.5	105	30	15

- = not calculable. na = not applicable. ne = not eligible; data were not collected for this field before 2007.

nec = not elsewhere classified.

[a] In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. "2007new" presents data as collected in 2007; "2007old" shows data as they would have been collected in prior years. See "Data Source and Limitations" for more detail.
[b] Percent change estimates including counts from 2007 or 2010 are rounded to the nearest 5% to reflect potential imprecision of this estimate due to methodological changes in those survey cycles.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

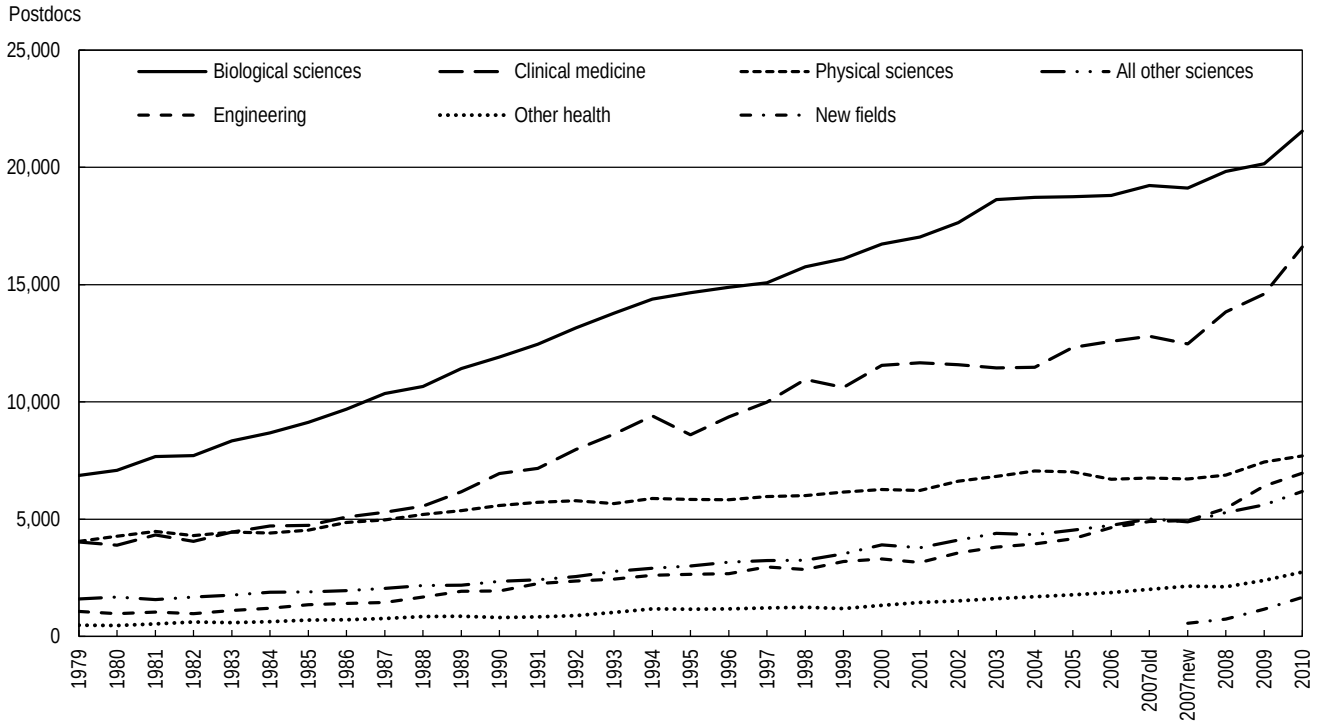
from the methodological changes made in the 2007 through 2010 GSS, all growth rate calculations comparing pre- and post-2007 counts are rounded to the nearest 5%. (See "Data Source and Limitations" for more information.)

The GSS data show that the number of postdocs increased across all science, engineering, and health (SEH) fields, with most fields experiencing substantial growth in each decade since 1980. Over the past decade (2000–10), postdoc employment in engineering had the fastest growth, with 8 of 14 engineering fields more than doubling the number of postdocs employed within them. Among the sciences, only computer sciences had a similar rate of growth.

As in 1979, the most common fields for postdocs in 2010 were the biological sciences, clinical medicine, and physical sciences fields. Even though the number of postdocs employed in the physical sciences has nearly doubled since 1979 (figure 2), the proportion of SEH postdocs in the physical sciences has declined substantially over time, dropping from 22.4% of all SEH postdocs in 1979 to 12.1% in 2010. By contrast, the proportion of SEH postdocs in engineering increased substantially over time, increasing from 5.9% of all postdocs in 1979 to 11.0% in 2010.

As part of the 2007 survey redesign, five new fields (communication, family and consumer sciences/human sciences, multidisciplinary/interdisciplinary studies, neuroscience, and architecture) were added to the list of GSS eligible fields.[2] As seen in table 1, the number of postdocs in each of these fields has grown substantially since the fields were introduced to the GSS in 2007, especially in neuroscience and multidisciplinary/interdisciplinary studies. However, as shown in figure 2, these five new fields account for a small proportion of all postdocs. Because many of these postdocs were likely to have been reported under other SEH fields before the expansion of the GSS eligible fields list, the impact of these additional fields had limited effect on the overall increase in postdocs. Of the 1,673 postdocs reported in these new fields in 2010, a total of 913 were in units that existed under different GSS fields in 2006. Therefore, adding these five new fields accounted for an additional 760 postdocs, approximately 5% of the overall increase of approximately 14,100 in postdoc counts from 2006 to 2010.

FIGURE 2. Postdocs in science, engineering, and health, by field: 1979–2010



NOTES: In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. "2007new" presents data as collected in 2007; "2007old" shows data as they would have been collected in prior years. See "Data Source and Limitations" for more detail.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

Postdoc Employment by Demographic Characteristics

Women constituted 38.1% of the postdoc workforce in 2010, up from 18.5% in 1979 (table 2). Following 2 decades of growth, the proportion of foreign postdocs holding temporary visas leveled off in the early 2000s and declined from 2007 to 2009.

In 2010 the postdoc section was expanded to include data on the race and ethnicity of U.S. citizens and permanent residents. This key change was part of a larger expansion of the postdoc data collection designed to meet the analytical needs of the postdoc community, and it is discussed in greater detail below (see "Methodological Changes: 2007–10"). The 2010 GSS postdoc data indicate that blacks or African Americans and Hispanics or Latinos are significantly underrepresented within the postdoc ranks (table 2). Among all U.S. citizen and permanent resident postdocs in 2010, only 3.0% were black or African American and 3.9% were Hispanic or Latino. These figures are less than half of the percentages seen among graduate students enrolled in SEH fields in 2010 (8.0% and 7.3%, respectively) and even lower than the percentages found in the adult U.S. citizen population aged 21–45 (13.8% and 11.9%, respectively).[3]

Units Reporting Postdocs

A final indicator of the increasing prevalence of postdocs in SEH disciplines

TABLE 2. Institutional (2010 Carnegie) classification and sex, citizenship, ethnicity, and race of postdocs in science, engineering, and health: 1979–2010

											Percent change[b]					
Characteristic	1979	1980	1990	2000	2006	2007old[a]	2007new[a]	2008	2009	2010	1979–2010	1980–90	1990–2000	2000–10	2007new–10	2009–10
All postdocs	18,101	18,399	29,565	43,115	49,343	50,712	50,840	54,164	57,805	63,415	250	60.7	45.8	45	25	10
Male	14,761	14,856	21,572	29,606	31,760	32,860	32,942	33,943	35,987	39,249	165	45.2	37.2	35	20	10
Female	3,340	3,543	7,993	13,509	17,583	17,852	17,898	20,221	21,818	24,166	625	125.6	69.0	80	35	10
U.S. citizens and permanent residents[c]	12,036	11,893	15,115	19,452	21,147	22,022	22,103	24,915	27,105	29,769	145	27.1	28.7	55	35	10
Hispanic or Latino	na	na	na	na	na	na	na	na	na	1,160	-	-	-	-	-	-
Not Hispanic or Latino																
American Indian or Alaska Native	na	na	na	na	na	na	na	na	na	93	-	-	-	-	-	-
Asian	na	na	na	na	na	na	na	na	na	5,174	-	-	-	-	-	-
Black or African American	na	na	na	na	na	na	na	na	na	898	-	-	-	-	-	-
Native Hawaiian or Other Pacific Islander	na	na	na	na	na	na	na	na	na	92	-	-	-	-	-	-
White	na	na	na	na	na	na	na	na	na	15,689	-	-	-	-	-	-
More than one race	na	na	na	na	na	na	na	na	na	140	-	-	-	-	-	-
Unknown ethnicity or race	na	na	na	na	na	na	na	na	na	6,523	-	-	-	-	-	-
Temporary visa holders	6,065	6,506	14,450	23,663	28,196	28,690	28,737	29,249	30,700	33,646	455	122.1	63.8	40	15	10
Institutional classification																
Research universities (very high research activity)	14,633	15,086	23,996	34,827	39,535	40,422	40,500	43,243	46,221	50,852	250	59.1	45.1	45	25	10
Research universities (high research activity)	1,122	1,187	1,859	2,588	2,703	3,020	3,041	3,242	3,557	3,608	220	56.6	39.2	40	20	0
Doctoral universities	298	287	227	456	525	574	574	577	652	682	130	-20.9	100.9	50	20	5
Medical and other health institutions	1,721	1,560	3,014	4,281	5,436	5,522	5,551	5,873	6,149	6,789	295	93.2	42.0	60	20	10
Other institutions	327	279	469	963	1,144	1,174	1,174	1,229	1,226	1,484	355	68.1	105.3	55	25	20

- = not calculable; na = not applicable.

[a] In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. "2007new" presents data as collected in 2007; "2007old" shows data as they would have been collected in prior years. See "Data Source and Limitations" for more detail.

[b] Percent change estimates including counts from 2007 or 2010 are rounded to the nearest 5% to reflect potential imprecision of this estimate due to methodological changes in those survey cycles.

[c] Ethnicity and race data are available only for U.S. citizens and permanent residents. See "Data Source and Limitations" for more detail on changes in the reporting of ethnicity and race.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

is the growth of the number of institutions and units (academic departments, programs, research centers, or health care facilities) reporting one or more postdocs. From 1979 through 2006, the number of institutions in the GSS that reported postdocs was relatively stable, whereas the number of units within institutions reporting postdocs grew steadily (table 3).[4]

As shown in table 3, the number and proportion of units reporting postdocs has increased almost every year since 1979. These increases serve as key indicators of the expansion of postdoc employment in the U.S. academic sector. However, the large increases in the number of units reporting postdocs since 2007 are due at least in part to methodological changes.

TABLE 3. Institutions and units reporting one or more postdocs and total postdoc counts in science, engineering, and health: 1979–2010

	Institutions		Units				Postdocs		
Year	Number	Percent	Number	Percent	1-year growth rate	3-year growth rate	Number	1-year growth rate	3-year growth rate
1979	254	40.4	2,657	27.4	-	-	18,101	-	-
1980	255	40.7	2,686	27.4	1.1	-	18,399	1.6	-
1981	258	41.5	2,719	28.0	1.2	-	19,634	6.7	-
1982	258	42.4	2,667	27.8	-1.9	0.4	19,363	-1.4	7.0
1983	272	44.7	2,810	29.7	5.4	4.6	20,712	7.0	12.6
1984[a]	264	64.1	2,865	32.6	2.0	5.4	21,535	4.0	9.7
1985[a]	260	63.1	2,919	32.8	1.9	9.4	22,387	4.0	15.6
1986[a]	253	61.4	2,941	32.7	0.8	4.7	23,721	6.0	14.5
1987[a]	257	61.8	3,008	33.0	2.3	5.0	24,881	4.9	15.5
1988	267	44.1	3,020	30.2	0.4	3.5	26,123	5.0	16.7
1989	263	43.2	3,126	30.7	3.5	6.3	27,932	6.9	17.8
1990	264	43.3	3,255	31.4	4.1	8.2	29,565	5.8	18.8
1991	274	45.0	3,429	32.4	5.3	13.5	30,865	4.4	18.2
1992	267	43.9	3,565	32.8	4.0	14.0	32,747	6.1	17.2
1993	269	44.4	3,723	33.5	4.4	14.4	34,322	4.8	16.1
1994	272	45.0	3,838	33.8	3.1	11.9	36,377	6.0	17.9
1995	270	44.8	3,763	32.5	-2.0	5.6	35,926	-1.2	9.7
1996	270	44.8	3,755	32.4	-0.2	0.9	37,107	3.3	8.1
1997	271	45.1	3,809	32.9	1.4	-0.8	38,481	3.7	5.8
1998	274	45.6	3,806	32.6	-0.1	1.1	40,086	4.2	11.6
1999	268	44.7	3,886	32.9	2.1	3.5	40,800	1.8	10.0
2000	266	44.6	3,954	33.2	1.7	3.8	43,115	5.7	12.0
2001	257	42.8	3,840	32.1	-2.9	0.9	43,311	0.5	8.0
2002	260	43.6	3,980	32.8	3.6	2.4	45,034	4.0	10.4
2003	257	43.3	3,997	32.6	0.4	1.1	46,728	3.8	8.4
2004	261	44.2	4,039	32.9	1.1	5.2	47,240	1.1	9.1
2005	261	44.4	4,146	33.7	2.6	4.2	48,555	2.8	7.8
2006	274	46.6	4,259	34.6	2.7	6.6	49,343	1.6	5.6
2007old[b]	283	48.6	4,471	36.3	5.0	10.7	50,712	2.8	7.3
2007new[b]	283	48.6	4,495	35.6	-	-	50,840	-	-
2008	289	49.9	4,843	36.8	7.7	16.8	54,164	6.5	11.6
2009	297	51.7	5,130	38.6	5.9	20.5	57,805	6.7	17.1
2010	326	56.8	5,636	41.1	9.9	25.4	63,415	9.7	24.7

- = not calculable.

[a] From 1984 to 1987, the number of participating institutions dropped substantially as master's-granting institutions were subsampled and counts were imputed for the nonsampled institutions within two dummy institutions titled Unsampled Public Master's and Unsampled Private Master's. As a result, the proportion of institutions reporting postdocs is not comparable to cycles prior to 1984 or after 1987.
[b] In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. "2007new" presents data as collected in 2007; "2007old" shows data as they would have been collected in prior years. See "Data Source and Limitations"" for more detail.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

Methodological Changes: 2007–10

The recent rates of growth in institutions and units reporting postdocs and the count of postdocs were influenced, in part, by methodological changes between 2007 and 2010. In addition to the expansion of the GSS eligible fields discussed above, the National Science Foundation (NSF) and the National Institutes of Health (NIH) authorized four key changes in the GSS data collection designed to improve postdoc reporting (year of implementation in parentheses):

- Replacing the term "department" with "organizational unit" to capture nontraditional department-like places where postdocs work (2007)
- Encouraging schools to designate a coordinator specifically for reporting postdoc data (2008–10)
- Expanding the postdoc data items to collect more detailed counts by ethnicity, race, source and mechanism of support, and type and origin of doctoral degree (2010)
- Sending letters to institution presidents with a formal request to designate a Postdoc Coordinator and to increase institutions' participation in the postdoc data improvement efforts (2010)

Change in Terminology

The change in terminology from "department" to "organizational unit" was implemented in 2007 to explicitly include nontraditional departments and places were postdocs are employed, such as laboratories, centers, and other affiliated research units. This change was made because postdocs in these units may have been omitted in prior cycles because of the survey's focus on academic departments enrolling graduate students.

The increased reporting of postdocs in nondegree granting units (e.g., research centers and laboratories) in the GSS institutions is a key driver of the overall increase in postdoc counts from 2007 to 2010 (figure 3). After being relatively stable for over 20 years, the number of nondegree granting units reporting postdocs increased substantially between 2007 and 2010. Of the 21,393 postdocs reported in nondegree granting units in 2010, a total of 6,105 were in units added since 2006, representing 43.4% of the overall 14,072 increase in postdoc counts from 2006 to 2010.

Postdoc Coordinator and Postdoc Data Expansion

Over the past decade, research sponsored by NSF and NIH consistently suggested that postdocs were being underreported in the GSS and other studies and that more detailed information, similar to what GSS collects on the graduate students, was needed to better understand the postdoc labor market.[5] Among the factors leading to difficulties in accurate reporting of postdoc data were institutional differences in how postdocs were defined and tracked and the lack of centralized recordkeeping systems for postdocs.

To improve the access and accuracy of the GSS postdoc data, NSF has been working with GSS institutions to identify individuals best qualified to provide their institution's postdoc data. Until 2008, schools typically appointed a School Coordinator (SC) to be responsible for reporting both student and postdoc data. To improve reporting, NSF was interested in the efficacy of appointing two coordinators: a Student Coordinator (StC) to report the graduate enrollment data and a Postdoc Coordinator (PC) to report information on postdocs and other nonfaculty doctorate researchers. In 2008, a total of 19 PCs were identified and given the ability to report the postdoc data for their schools and units independently from the graduate student data collection. In 2009, a Postdoc Pilot Study was conducted to determine (1) whether schools could provide detailed data on their postdocs' race and ethnicity, source of financial support, and type of doctorate degrees held and (2) whether having a separate PC would improve postdoc reporting. The results of the study, which included 48 small schools and 20 larger schools, confirmed the viability of both.[6]

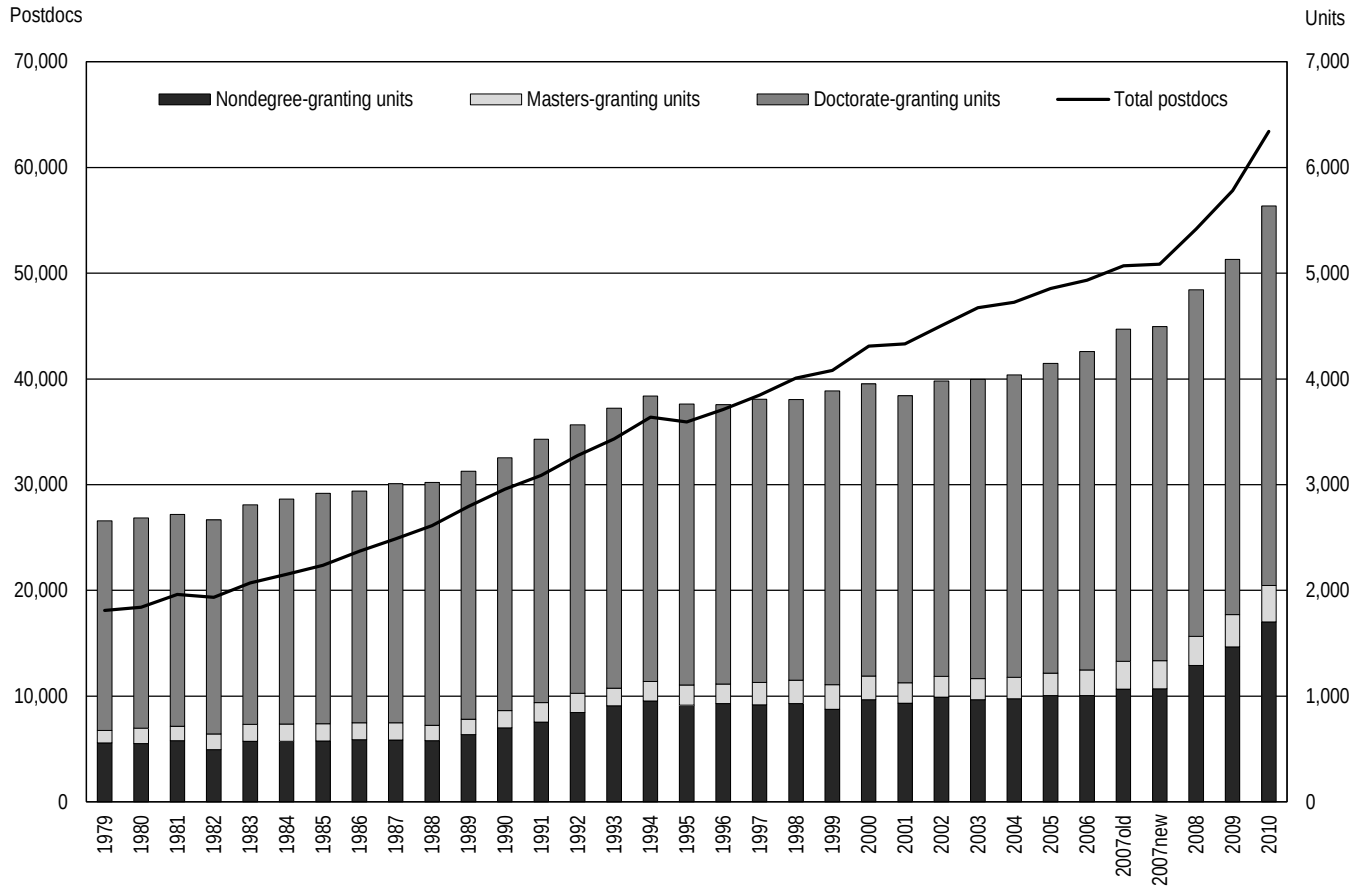
A final objective of the 2009 Postdoc Pilot Study was to identify the common characteristics of a postdoc position across institutions. Respondents were asked to indicate which common characteristics of postdoc positions were applicable to postdocs at their institution. The following characteristics were reported by more than 80% of responding institutions:

- Requires a PhD or an equivalent doctorate degree
- Provides training in research
- Is intended to advance professional skills
- Requires that the postdoc work be under the direction of a senior scholar
- Is intended to prepare the postdoc for an independent career in research

These characteristics matched well with the GSS definition, which focuses on recent doctorate recipients with limited-term appointments primarily intended for training under the supervision of a senior scholar. The results also confirmed the substantial variation across institutions and identified the need to collect this information across all GSS institutions.

Because of the success of the Postdoc Pilot Study, the postdoc section of the 2010 GSS survey was substantially expanded to align with the graduate student items and to include questions concerning the criteria used to

FIGURE 3. Number of GSS eligible units, units reporting postdocs and postdoc counts, by units' highest-degree-granting status: 1979–2010



GSS = Survey of Graduate Students and Postdoctorates in Engineering.

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SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

define postdocs. All schools were also requested by NSF to designate a separate PC as needed.

Letter to Institution Presidents

To highlight these survey changes and to increase institutions' participation in the postdoc data improvement efforts, a letter was sent from NSF and NIH in 2010 to the president of each institution emphasizing the importance of postdoc data in GSS and providing summary information on the postdoc counts reported by their institution in the 2008 and 2009 GSS. If these data were not accurate, the letter asked the president to designate a PC.

In 2010, a total of 125 schools opted to split the GSS data collection responsibilities between a StC and a PC. Of the 567 schools that retained a single SC, 104 schools replaced the 2009 SC with a new SC. Tables 4 and 5 show the results of these changes, by looking at changes in postdoc reporting by coordinator type.

Several key distinctions were found between schools that used PCs and those that did not (table 4). First, schools where postdocs were spread across many units were more likely to use a PC than were schools where the postdocs were concentrated within a few units. Postdocs were reported in a higher proportion of units in schools with a PC than in schools that had a single SC. For example, 68.1% of the units in schools with a PC in 2008 had postdocs as compared to 36.1% of the units in schools with an SC.

Second, new PCs were much more likely to add new units than were SCs

TABLE 4. Changes in organizational unit counts, by coordinator type and unit add-drop status: 2001–10

Year	Coordinator type	All units[a]	Units with 1 or more postdocs				Percentage of units with postdocs			
			Total	Added	Dropped	Extant	Total	Added	Dropped	Extant
2001	SC	12,010	3,840	66	-48	3,774	32.0	0.5	-0.4	31.4
2002	SC	12,166	3,980	148	-40	3,832	32.7	1.2	-0.3	31.5
2003	SC	12,315	3,997	87	-54	3,910	32.5	0.7	-0.4	31.7
2004	SC	12,352	4,039	113	-84	3,926	32.7	0.9	-0.7	31.8
2005	SC	12,353	4,146	153	-56	3,993	33.6	1.2	-0.5	32.3
2006	SC	12,395	4,259	127	-75	4,132	34.4	1.0	-0.6	33.3
2007old[b]	SC	12,482	4,471	225	-157	4,246	35.8	1.8	-1.3	34.0
2007new[b]	SC	12,629	4,495	24	0	4,471	35.6	0.2	0.0	35.4
2008	SC	12,910	4,659	288	-82	4,371	36.1	2.0	-0.6	33.9
2008	New PC	270	184	32	-7	152	68.1	11.9	-2.6	56.3
2009	SC	12,525	4,740	192	-64	4,548	37.8	1.5	-0.5	36.3
2009	New PC	475	203	55	0	148	42.7	11.6	0.0	31.2
2009	Prior PC	248	187	0	-1	187	75.4	0.0	-0.4	75.4
2010	SC	10,583	3,941	284	-55	3,657	37.2	2.7	-0.5	34.6
2010	New PC	2,680	1,385	235	-39	1,150	51.7	8.8	-1.5	42.9
2010	Prior PC	572	310	0	-30	310	54.2	0.0	-5.2	54.2

PC = Postdoc Coordinator; prior PC = PC in schools that used a PC in a prior survey cycle; SC = School Coordinator.

[a] Represents the total number of units that were assessed by the coordinator, and includes units that were dropped during data collection because they no longer had postdocs.

[b] In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. "2007new" presents data as collected in 2007; "2007old" shows data as they would have been collected in prior years. See "Data Source and Limitations" for more detail.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

or PCs in schools that had designated a PC in a prior cycle; new units with postdocs represented 11.9%, 11.6%, and 8.8% of all units in schools with new PCs in 2008, 2009, and 2010, respectively. As shown in table 5, of the 63,415 postdocs reported in 2010, a total of 2,358 were in units added by PCs in the prior three cycles, representing 16.8% of the overall 14,072 increase in postdoc counts from 2006 to 2010 (table 3).

Finally, as shown in table 4, in both 2009 and 2010 no new postdoc units were added within schools that currently had a PC and had used a PC in a prior cycle. Together, these differences provide substantial evidence that new PCs improved survey coverage by adding previously unreported, but eligible, units. These findings also suggest that improvements in coverage are a one-time phenomenon occurring the year a PC is added.

Table 5 provides additional evidence that the addition of a PC improved postdoc reporting and that this effect was primarily felt in the year the PC was added. As seen in the percentage change for the prior year, new PCs increased overall postdoc reporting in their schools by 17.0% in 2008, 46.6% in 2009, and 15.6% in 2010. Each of these increases is significantly higher than was typical prior to 2008 and greater than their peers (SC and PC in a school that had used a PC in a prior year) in each of these years. Although some of the increases in postdoc counts reported by new PCs were associated with newly added units, new PCs also increased the number of postdocs reported within extant units at a higher rate than SCs or PCs in schools that had designated a PC in a prior cycle.

This finding demonstrates that PCs also improved survey accuracy by adding postdoc counts to units where prior SCs could not. New PCs increased postdoc reporting within extant units by 10.5% in 2008, 16.6% in 2009, and 5.8% in 2010. Finally, increases in postdoc counts were lowest in 2009 and 2010 among schools that had previously used a PC, underscoring the notion that the primary impact of adding a PC is achieved the year the PC is added.

Overall Impact of Methodological Improvements on Postdoc Counts

The overall impact of these methodological changes on the postdoc data is difficult to estimate. Two different ways of estimating the impact can be examined.

First, there is the directly observed impact of the methodological changes. In the 2010 data collection, 7,160 postdocs were reported in 879 units that meet at least one of the following criteria:

TABLE 5. Changes in postdoc counts, by coordinator type: 2001–10

Year	Coordinator type	Postdocs					Percent change from prior year			
		Prior total	Current total	In added units	In dropped units	In extant units	Total	In added units	In dropped units	In extant units
2001	SC	43,115	43,311	416	-455	235	0.5	1.0	-1.1	0.5
2002	SC	43,311	45,034	993	-300	1,030	4.0	2.3	-0.7	2.4
2003	SC	45,034	46,728	499	-368	1,563	3.8	1.1	-0.8	3.5
2004	SC	46,728	47,240	1,901	-960	-429	1.1	4.1	-2.1	-0.9
2005	SC	47,240	48,555	879	-352	788	2.8	1.9	-0.7	1.7
2006	SC	48,555	49,343	1,777	-1,076	87	1.6	3.7	-2.2	0.2
2007old[a]	SC	49,343	50,712	2,199	-1,827	997	2.8	4.5	-3.7	2.0
2007new[a]	SC	50,712	50,840	128	-	-	0.3	0.3	-	-
2008	SC	45,131	47,482	1,665	-606	1,292	5.2	3.7	-1.3	2.9
2008	New PC	5,709	6,682	498	-124	599	17.0	8.7	-2.2	10.5
2009	SC	46,303	49,394	1,268	-272	2,095	6.7	2.7	-0.6	4.5
2009	New PC	1,179	1,729	354	0	196	46.6	30.0	0.0	16.6
2009	Prior PC	6,682	6,682	0	-1	1	0.0	0.0	0.0	0.0
2010	SC	36,353	39,760	2,444	-416	1,379	9.4	6.7	-1.1	3.8
2010	New PC	13,423	15,519	1,610	-295	781	15.6	12.0	-2.2	5.8
2010	Prior PC	8,029	8,136	0	-171	278	1.3	0.0	-2.1	3.5

- = not calculable.

PC = Postdoc Coordinator; prior PC = PC in schools that used a PC in a prior survey cycle; SC = School Coordinator.

[a] In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. "2007new" presents data as collected in 2007; "2007old" shows data as they would have been collected in prior years. See "Data Source and Limitations" for more detail.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

- The unit was added in one of the new fields added to the GSS code list in 2007.
- The unit was a nondegree granting unit added since 2006.
- The unit was added by a PC.

This count represents 50.9% of the overall change in the number of postdocs reported from 2006 to 2010.

Another method of estimating the impact would be to assume the growth of postdoc employment would have remained steady over this period. From 1979 through 2006, postdoc employment grew by an average of 1,157 postdocs per year. Based on this average growth, expected growth from 2006 through 2010 is estimated at 4,628 and growth due to the methodological improvement is estimated at 9,444, or 67.1% of the observed growth.

Data Source and Limitations

Cosponsored by NSF and NIH, the GSS is an annual survey that provides data on the number and characteristics of graduate students, postdocs, and other doctorate-holding nonfaculty researchers in science, engineering, or selected health fields in all U.S. academic institutions granting doctorate and research-based master's degrees in these fields.

This InfoBrief is based on data published in the 2010 GSS. The 2010 GSS collected data on the graduate students and postdocs from 13,711 organizational units (departments, programs, affiliated research centers, and health care facilities) at 574 institutions of higher education and their affiliates in the United States, Puerto Rico, and Guam. The institutional response rate was 99.3%. An overview of the survey can be found at http://www.nsf.gov/statistics/srvygradpostdoc/.

In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. "2007new" presents data as collected in 2007, and "2007old" presents data as they would have been collected in 2006. Due to methodological changes in 2007, the data collected from 2007 through 2011 are not strictly comparable to those collected prior to 2007. As a result, care should be used when assessing trends within the GSS data. Ten-year trends reported in the tables are labeled "% change 2002–11." Note that these percentages are rounded to the nearest 5% and counts are rounded to the nearest 100 to reflect the extra variability in the estimate that

may have resulted from the methodological changes that occurred in 2007. Please see appendix A, "Technical Notes," in *Graduate Students and Postdoctorates in Science and Engineering: Fall 2007* (NSF 10-307) for a more detailed discussion of these changes.

Reporting of ethnicity and race in 2008–11 has been affected by changes in reporting of ethnicity and race in the Integrated Postsecondary Education Data System (IPEDS). Starting in 2008, IPEDS respondents were asked to use a new classification that included a category for two or more races (see http://nces.ed.gov/ipeds/reic/resource.asp) and separate reporting of Native Hawaiians and Other Pacific Islanders from Asians. The new classification was optional in 2008 and 2009 IPEDS but mandatory in 2010 and may have contributed to a significant increase in reporting of "Not Hispanic or Latino, More than one race" within the GSS data.

Each of the major methodological changes in GSS resulted in improved reporting of postdoc data. The expansion of the GSS code list in 2007, the change in focus from degree-granting graduate programs to eligible units regardless of degree-granting status, and the appointment of separate PCs improved coverage of postdocs in SEH fields. The expansion of the postdoc data items and appointment of more knowledgeable PCs improved postdoc data reporting within extant units.

In addition to improving the reporting of overall postdoc counts, the 2010 GSS provided more detailed information on postdocs, including the ethnicity and race of U.S. citizens and permanent residents; federal and nonfederal sources of financial support and support mechanism; type of doctoral degree, such as MD, PhD, or joint MD and PhD; and origin of doctoral degree (U.S. or foreign country).[7]

Notes

1. Peter Einaudi and Ruth Heuer are research analysts and Patricia Green is a survey director at RTI International. For further information, contact Kelly H. Kang, Human Resources Statistics Program, National Center for Science and Engineering Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (kkang@nsf.gov; 703-292-7796).

2. A complete list of GSS fields can be found in appendix B of *Graduate Students and Postdoctorates in Science and Engineering: Fall 2010* (http://www.nsf.gov/statistics/nsf13314/).

3. Einaudi P. 2011. *Two Decades of Increasing Diversity More than Doubled the Number of Minority Graduate Students in Science and Engineering.* InfoBrief NSF 11-319. Arlington, VA: National Science Foundation, National Center for Science and Engineering Statistics. Available at http://www.nsf.gov/statistics/infbrief/nsf11319/.

4. From 1984 to 1987, the number of GSS institutions dropped substantially as master's-granting institutions were subsampled and counts for the nonsampled institutions were imputed within two placeholder institutions labeled as Unsampled Public Master's and Unsampled Private Master's. As a result, the proportion of institutions reporting postdocs prior to 1984 and after 1987 is not comparable.

5. McFarland E, Einaudi P, Cook S, Richards A, Roe D, Zwieg E, Green P. 2010. GSS Recordkeeping Study. Report to the National Science Foundation. Research Triangle Park, NC: RTI International.

6. McFarland E, Steele B, Zwieg E, Green P. 2011. GSS Postdoc Pilot Study. Report to the National Science Foundation. Research Triangle Park, NC: RTI International.

7. National Science Foundation, National Center for Science and Engineering Statistics. 2013. *Graduate Students and Postdoctorates in Science and Engineering: Fall 2010.* Detailed Statistical Tables NSF 13-314. Arlington, VA. Available at http://www.nsf.gov/statistics/nsf13314/.

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