



National Center for Science and
Engineering Statistics

InfoBrief

Defining Postdocs in the Survey of Graduate Students and Postdocs (GSS): Institution Responses to the Postdoc Definitional Questions in the GSS 2010–16

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With approximately 65,000 postdoctoral researchers (postdocs) working at U.S. academic institutions in 2016, postdocs are an important segment of the U.S. research enterprise.¹ The National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF) is the primary collector of national data on postdocs, having annually surveyed academia about postdocs as part of the Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS) since 1979.² Rapid increases in postdoc appointments, along with significant changes to the academic labor market, led to the emergence of postdoc offices and associations on many campuses, calls for improved data, and the establishment of guidelines and best practices by the National Institutes of Health (NIH), NSF, the National Postdoctoral Association (NPA), and the National Academies of Sciences, Engineering, and Medicine.^{3,4,5}

Despite the increased focus on postdoc positions, identifying and counting postdocs remain difficult for many institutions. This is due to variations in the hiring and onboarding practices for postdocs and also to the lack of common definitions and job titles for postdoctoral appointments.⁶ In 2001, NSF and NIH established a formal postdoc definition as “an individual who has received a doctoral degree (or equivalent) and is engaged in a temporary and defined period of mentored advanced training to enhance the professional skills and research independence needed to pursue his or her chosen career path.”⁷ Although varying slightly over time, the NSF and NIH guidance regarding the postdoc definition has been consistent and always included four key components—namely, that postdoc positions are (1) training positions (2) for researchers with doctoral-level degrees that are (3) term limited and (4) preparation for an independent career in research. However, additional analysis is needed to determine the extent to which institutions use this definitional guidance in practice.

This InfoBrief examines institutional coordinators’ responses to a series of postdoc definition questions⁸ included in the Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS) from 2010 through 2016 ([figure 1](#)) by focusing on the following research questions:

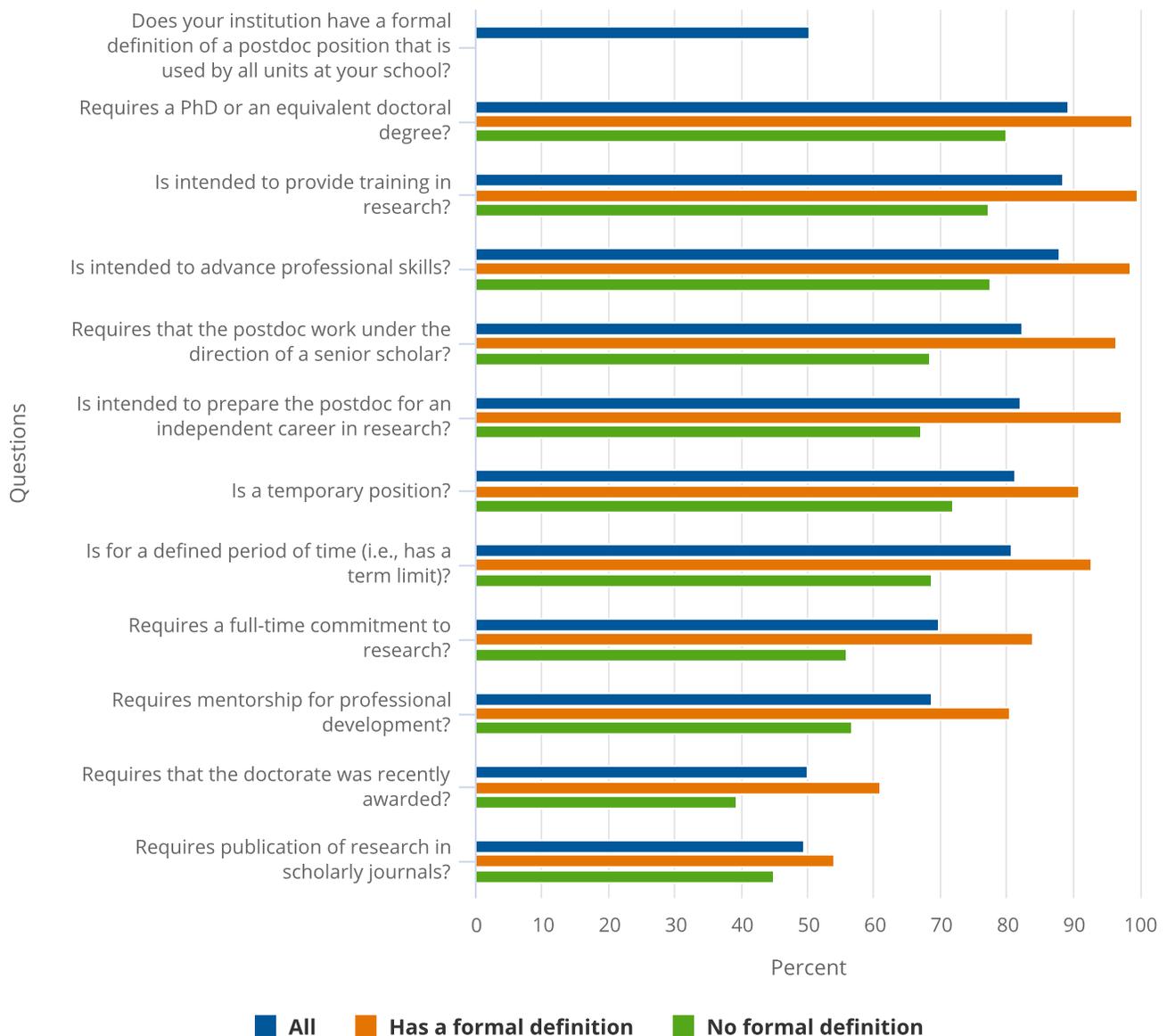
- Which items or job requirements are most commonly used by institutions to define postdocs?

- How do these items vary by institutional characteristics?
- Have institutional definitions and responses changed over time?

The GSS is an annual census of all U.S. academic institutions granting research-based master's degrees or doctorates in science, engineering, and selected health fields as of fall of the survey year. The survey, sponsored by NCSES and by NIH, collects the total number of graduate students, postdoctoral appointees, and doctorate-level nonfaculty researchers by demographic and other characteristics, such as source of financial support. Results are used to assess shifts in graduate enrollment, postdoctoral appointments, and trends in financial support.

Figure 1

Affirmative responses to postdoc items, total and according to whether the institution had a formal postdoc definition: Most recent response 2010–16



Note(s):

A total of 567 institutions responded. A total of 282 had a formal definition and 285 did not.

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Institutional coordinators with units⁹ reporting postdocs as part of the GSS were asked a series of questions regarding characteristics of or requirements for postdoctoral positions at their institution (postdoc items). These questions on job characteristics or requirements are detailed in [table 1](#) and are the basis for the report presented here.

Table 1**Affirmative responses to postdoc items, by type of school: Most recent response 2010–16**

(Percent)

Responses and questions	Type of control		HBCU		Land-grant institution	
	Public	Private, nonprofit	Yes	No	Yes	No
Number of responses	343	224	28	539	76	491
Requires a PhD or an equivalent doctoral degree?	88.9	90.2	89.3	89.4	93.4	88.8
Requires that the doctorate was recently awarded?	49.0	51.8	64.3	49.4	55.3	49.3
Is a temporary position?	83.1	78.6	82.1	81.3	88.2	80.2
Is intended to provide training in research?	88.9	87.5	92.9	88.1	96.1	87.2
Is intended to advance professional skills?	88.0	87.9	92.9	87.8	90.8	87.6
Requires a full-time commitment to research?	71.1	67.9	75.0	69.6	84.2	67.6
Requires that the postdoc work under the direction of a senior scholar?	81.6	83.5	89.3	82.0	90.8	81.1
Is for a defined period of time (i.e., has a term limit)?	81.6	79.5	82.1	80.7	90.8	79.2
Requires publication of research in scholarly journals?	46.6	53.6	71.4	48.2	52.6	48.9
Requires mentorship for professional development?	67.1	71.0	75.0	68.3	67.1	68.8
Is intended to prepare the postdoc for an independent career in research?	84.3	78.6	85.7	81.8	93.4	80.2
Does your institution have a formal definition of a postdoc position that is used by all units at your school?	51.6	46.9	28.6	50.8	64.5	47.5

HBCU = historically Black college or university.

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Job Characteristics or Requirements Most Commonly Used to Define Postdocs

Coordinators were asked 11 questions regarding attributes of postdoc positions at their school and an additional question to identify whether their school had a formal definition of a postdoc. This section details which characteristics or requirements were the most commonly reported by coordinators.

Almost 90% of coordinators indicated that postdoc positions required a doctoral degree, were intended to provide training in research, or were intended to advance professional skills ([figure 1](#)). In addition, about 80% of coordinators indicated that postdocs at their respective institutions were required to work under the direction of a senior scholar and that postdoc positions were intended to prepare the postdoc for an independent career in research and were temporary or of limited term. Together, these responses provide substantial support for the NSF-NIH definition and show broad agreement that postdocs have four key components: supervision, a limited term, training for doctoral degree holders to advance professional skills, and preparation for an independent career in research.

Less common are the requirements that postdocs require a full-time commitment to research, that postdocs are mentored (rather than supervised), that the doctorate award need to be recent, and that postdocs must publish research in scholarly journals. Specifically, 70% of the coordinators said mentoring was required, and only about half required that postdocs have earned their doctorate degree recently (50%) or have published in scholarly journals (49%). These lower proportions may be due to the wording of these items. For instance, coordinators may have different interpretations of the meaning of “recently awarded.” Similarly, an institution may not “require publication” in a scholarly journal but may expect postdocs to submit articles to scholarly journals for publication.

From a total of 567 schools, 134 (24%) answered yes to all the postdoc items, and the median number of affirmative responses was 9 out of 12 possible responses.

Differences in Affirmative Responses by Institutional Characteristics

Formal Definition for Postdocs

Having a formal postdoc definition was an important factor differentiating the responses to the postdoc items ([figure 1](#)). Half of the responding coordinators indicated that their respective institutions had a formal definition for postdocs that was used by all units at their institutions. Coordinators at institutions that had a formal definition for postdocs were more than twice as likely as those at institutions with no formal definition to answer positively to all of the postdoc items (32%, or 91 out of 282 schools with a formal definition versus 15%, or 43 out of 285 institutions without a formal definition).

Nearly all (95% or higher) coordinators at institutions with a formal postdoc definition answered yes to the following five items about postdocs: they required a PhD or equivalent, were intended to provide training in research, were intended to advance professional skills, required work under a senior scholar, and were intended to prepare the postdoc for an independent career in research ([figure 1](#)). In addition, more than 90% of coordinators at institutions with a formal postdoc definition indicated that the position was temporary or for a defined period. Relatively low proportions of coordinators at these institutions indicated that they required the doctorate to have been recently awarded or that they required publication of research in scholarly journals.

Institution Type and Size

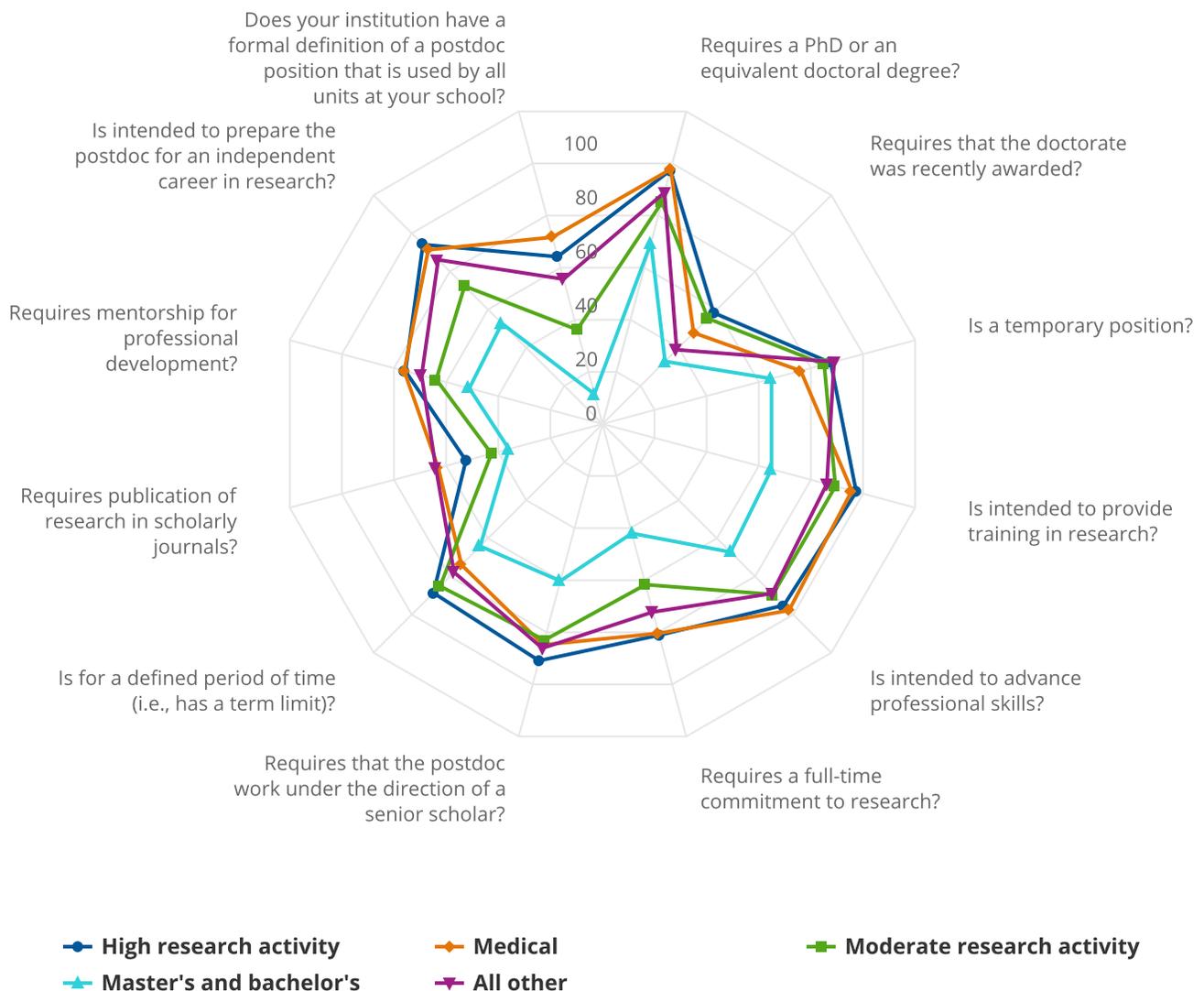
Coordinators from high research activity doctoral institutions and medical schools answered yes to the postdoc items at higher rates than coordinators from institutions in other Carnegie Classifications¹⁰ ([figure 2](#)). Consistent with the higher percentages of affirmative responses overall, these types of institutions were most likely to have a formal definition for postdocs. Overall, master’s and bachelor’s institutions had the lowest percentages responding affirmatively to all postdoc items and high research activity and medical institutions generally had the highest percentages responding affirmatively. Moderate research institutions and all other institutions tended to fall in between. Items with lower affirmative responses on average, such as the recency of the doctorate and the publication requirement, differed in their importance across institution types: the publication requirement was more common within the medical and all other institutions, whereas having a recent degree was more common at high and moderate activity research institutions.

Coordinators at public institutions reported having a postdoc definition more often than did coordinators at private nonprofit institutions. Coordinators at historically Black colleges and universities (HBCUs) were substantially less likely than those from non-HBCUs to report having a formal postdoc definition, yet they responded affirmatively to more postdoc items than did those at non-HBCU schools. At land-grant institutions, coordinators were more likely than their peers at non-land-grant institutions to have a formal definition for postdocs and to respond affirmatively to the different postdoc items ([table 1](#)).

More strikingly, the percentage of coordinators affirming the postdoc items and indicating a formal postdoc definition increased with institution size. For example, 32% of coordinators at schools with 10 or fewer eligible units reported having a formal postdoc definition, compared with 81% of coordinators at schools with more than 75 units ([figure 3](#)). This difference is even larger when using the number of postdocs reported as the measure of institution size: 14% of coordinators who reported zero postdocs indicated that their institution had a formal postdoc definition, compared with 81% of those reporting more than 200 postdocs ([figure 4](#)).

Figure 2

Affirmative responses to postdoc items, by institutions' 2015 Carnegie Classification: Most recent response 2010–16

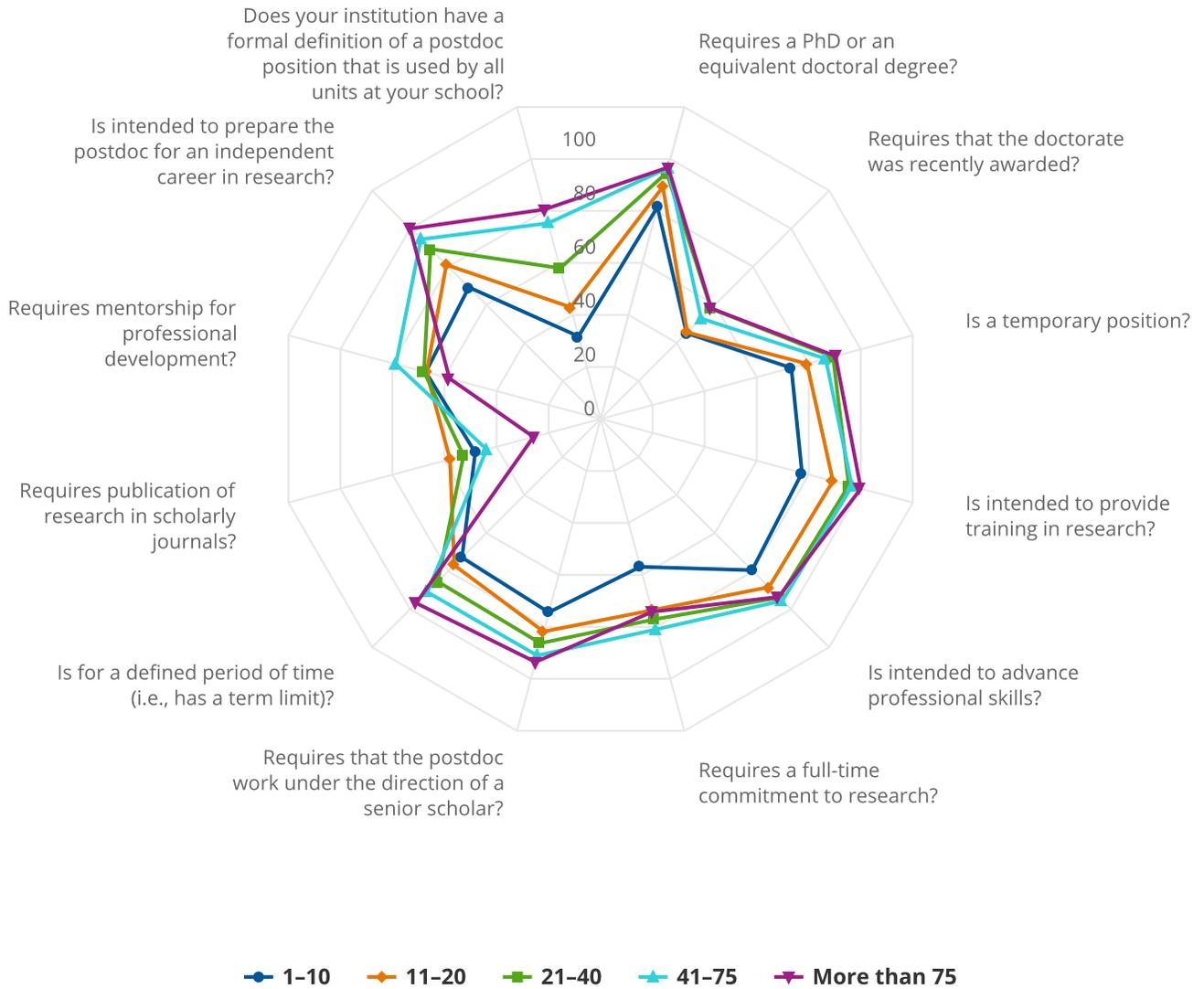


Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

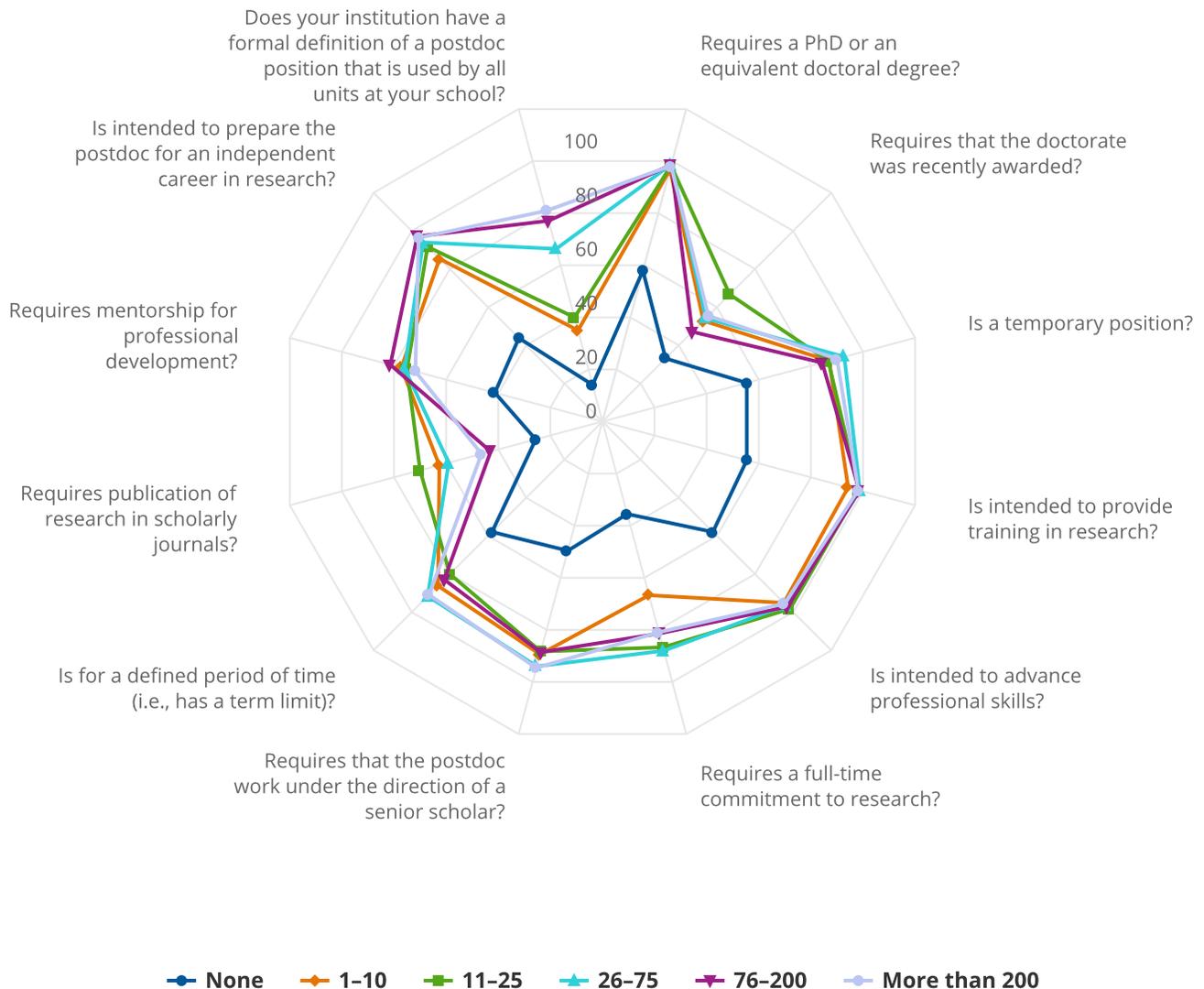
Figure 3

Affirmative responses to postdoc items, by number of units in the school: Most recent response 2010–16



Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Figure 4**Affirmative responses to postdoc items, by number of postdocs (postimpudation published counts): Most recent response 2010–16****Source(s):**

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Across all postdoc requirements, the proportion of affirmative responses was lowest for institutions with zero postdocs. However, among institutions with any postdocs, the pattern of affirmative responses varied for the different postdoc requirements according to how many postdocs were at an institution. Compared with institutions with between 1 and 200 postdocs, a smaller proportion of institutions with over 200 postdocs reported a mentorship requirement while a larger proportion reported direction under a senior scholar (figure 4). For other items, such as requiring a recent doctorate or advancing professional skills, the proportion of affirmative responses did not systematically vary across number of postdocs. Interestingly, the number of postdocs was inversely related to the percentage of coordinators reporting a scholarly journal requirement, in that smaller programs were more likely than larger programs to indicate that this was a requirement (figure 4).

Composition of Postdoc Populations

Along with differences in institution size, differences in the composition of the postdoc population at an institution may relate to coordinator responses to the postdoc items. For example, mentoring may be an expected part of the postdoctoral experience in some fields but not in others.

Answers for coordinators at schools with over 200 postdocs in biological and health sciences tended to correspond with the NIH funding requirements for postdocs. For example, among schools with over 200 postdocs, more coordinators at schools with postdocs in biological and health sciences than with postdocs in engineering reported that postdocs required a full-time commitment to research and required mentorship for professional development (table 2). Given that there are more postdoc positions in the biological and health sciences, as the number of biological and health science postdocs increased, the proportion of coordinators responding that a recently received doctorate was deemed a requirement decreased.

A smaller proportion of coordinators at schools with more than 50 engineering postdocs indicated that professional development mentoring was required than did coordinators at schools with 50 or fewer engineering postdocs. The inverse was true regarding whether a recently awarded doctorate was required.

Table 2

Affirmative responses to postdoc items by schools, by broad field: Most recent response 2010–16

(Percent)

Responses and questions	Number of postdocs in biological and health sciences					Number of postdocs in engineering			
	None	1–10	11–50	51–200	More than 200	None	1–10	11–50	More than 50
Number of responses	185	135	89	95	63	359	87	75	46
Requires a PhD or an equivalent doctoral degree?	71.4	97.8	96.6	99.0	100.0	85.0	96.6	98.7	95.7
Requires that the doctorate was recently awarded?	39.5	61.5	55.1	50.5	49.2	45.7	55.2	52.0	71.7
Is a temporary position?	68.1	85.2	89.9	86.3	92.1	76.9	85.1	96.0	84.8
Is intended to provide training in research?	68.1	97.0	97.8	99.0	100.0	83.8	95.4	97.3	95.7
Is intended to advance professional skills?	69.7	97.0	96.6	96.8	96.8	84.4	95.4	93.3	93.5
Requires a full-time commitment to research?	47.6	75.6	85.4	80.0	85.7	66.0	72.4	85.3	69.6
Requires that the postdoc work under the direction of a senior scholar?	63.2	89.6	92.1	90.5	96.8	78.3	86.2	90.7	93.5
Is for a defined period of time (i.e., has a term limit)?	68.7	83.0	89.9	86.3	90.5	75.8	85.1	94.7	89.1
Requires publication of research in scholarly journals?	37.3	64.4	57.3	45.3	47.6	50.1	52.9	45.3	43.5
Requires mentorship for professional development?	52.4	78.5	74.2	74.7	77.8	68.0	71.3	76.0	56.5
Is intended to prepare the postdoc for an independent career in research?	57.3	88.9	94.4	96.8	100.0	76.0	90.8	93.3	93.5
Does your institution have a formal definition of a postdoc position that is used by all units at your school?	23.2	41.5	65.2	71.6	90.5	41.0	51.7	72.0	78.3

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Postdoc Demographic Characteristics

Larger proportions of coordinators at schools with at least some postdocs who were in an underrepresented minority group indicated that postdoc positions were intended to prepare the individual for an independent career, compared with their peers at institutions with no postdocs in an underrepresented minority group. In addition, 85% of coordinators at schools where more than 10% of postdocs were underrepresented minorities indicated that mentoring for professional development was a requirement (table 3). These requirements were also more prevalent as the proportion of postdocs who were women increased to 25% or more. A smaller proportion of coordinators at institutions with at least 10% postdocs in an underrepresented minority group agreed that postdocs were temporary positions, compared with those at

institutions with fewer or no underrepresented minorities. Similarly, smaller proportions of coordinators at schools with higher percentages of female postdocs said that postdocs were for a defined period. Finally, the requirements of a full-time commitment to research and of the position being temporary increased with the proportion of postdocs with temporary visas.

Table 3**Affirmative responses to postdoc items by schools, by postdoc demographics: Most recent response 2010–16**

(Percent)

Responses and questions	Percent of postdocs who are underrepresented minorities			Percent of postdocs who are women			Percent of postdocs who are on temporary visas		
	None	Under 10%	10% or more	Under 25%	25%–49%	50% or more	None	Under 50%	50% or more
Number of responses	148	230	68	60	283	103	44	117	285
Requires a PhD or an equivalent doctoral degree?	98.0	98.3	97.1	96.8	98.2	97.1	100.0	95.7	98.6
Requires that the doctorate was recently awarded?	56.8	53.9	52.9	43.8	56.2	54.4	56.8	52.1	55.4
Is a temporary position?	88.5	88.3	55.4	89.7	89.4	83.5	81.8	85.5	90.5
Is intended to provide training in research?	96.0	98.3	97.1	93.5	98.2	95.2	97.7	96.6	97.5
Is intended to advance professional skills?	95.3	97.0	95.6	93.2	96.5	96.1	97.7	92.3	97.5
Requires a full-time commitment to research?	74.3	83.9	73.5	69.4	87.5	67.9	68.2	77.8	81.4
Requires that the postdoc work under the direction of a senior scholar?	89.2	91.7	94.1	90.0	92.2	87.4	90.9	88.0	92.6
Is for a defined period of time (i.e., has a term limit)?	85.8	88.3	85.3	92.9	86.9	83.5	86.4	84.6	88.1
Requires publication of research in scholarly journals?	61.5	49.1	66.2	55.5	51.9	61.2	61.4	56.4	54.7
Requires mentorship for professional development?	75.0	73.9	85.3	68.2	76.3	78.6	84.1	70.9	76.8
Is intended to prepare the postdoc for an independent career in research?	86.5	95.7	94.1	79.4	94.7	91.3	88.6	93.2	92.6
Does your institution have a formal definition of a postdoc position that is used by all units at your school?	41.2	73.5	51.5	26.7	67.8	50.5	38.6	61.5	61.8

Note(s):

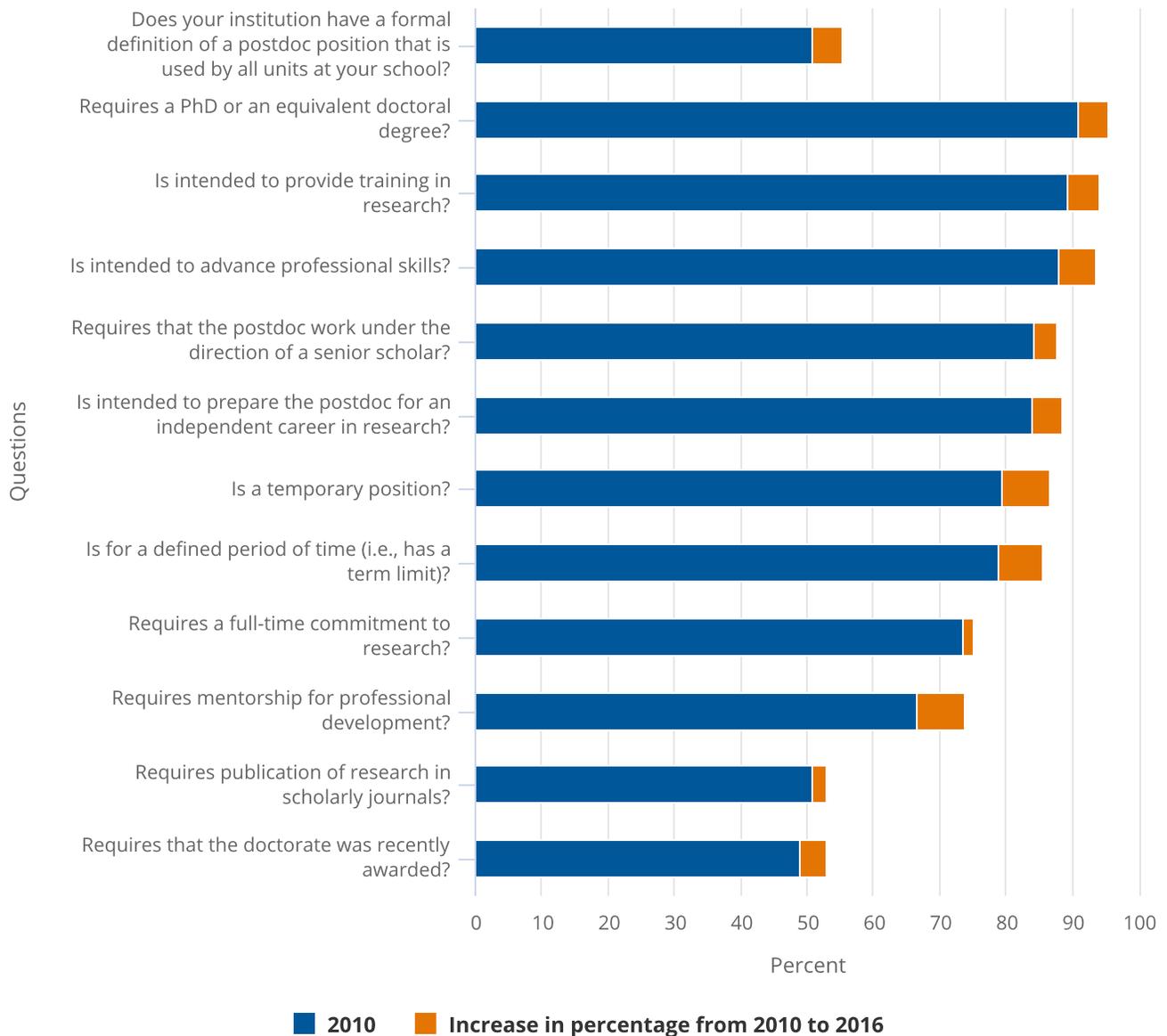
Excludes 121 schools with zero postdocs.

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Time Trends in Affirmative Responses to Different Requirements

Between 2010 and 2016, the proportion of coordinators responding yes increased for all the postdoc items (figure 5). The postdoc items that increased the most were mentorship for professional development and the two items referring to the temporary nature of postdoc positions (by approximately 7 percentage points each). The relative growth of these three items is consistent with the guidelines put forth by NIH, NSF, NPA, and Sigma Xi suggesting that individuals spend no more than 5 years in postdoc positions and that postdoc positions include formal career development plans.¹¹

Figure 5**Change over time for affirmative responses to postdoc items: 2010–16****Note(s):**

Includes schools with valid responses to all questions.

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Conclusions

The guidelines for postdoc definitions established by national organizations and funding agencies are influential and seem to be driving the definitions being used by the U.S. academic institutions that employ postdocs. Of the 11 postdoc items included in the GSS from 2010–16, the majority of items specified within the NSF-NIH postdoc definition were cited as requirements by more than 80% of responding coordinators, and each of these items became more common over the 7-year period. The most common postdoc items were requires a doctorate degree, are temporary positions, are for a defined period, are intended to prepare for an independent career in research, provide training in research, advance professional skills, and require work under the direction of a senior scholar.

Although the GSS data show substantial agreement on key characteristics of postdoc employment, they also suggest that substantial variation in postdoc definitions remain across institutions. Postdoc requirements varied by institutional characteristics as well as by postdoc demographics. For example, coordinators at institutions with formalized postdoc definitions were more likely than those at institutions without a formalized definition to include each of the requirements. Coordinators at larger institutions and those with greater research activity were more likely than their peers at other institutions to include the most common requirements. Although postdoc requirements differed by the proportions of underrepresented minority postdocs, female postdocs, and postdocs with temporary visas, these differences tended to be smaller than those associated with institutional characteristics and were limited to a few of the postdoc requirements.

Finally, the variation in postdoc requirements has implications for the collection of postdoc data and the clarification of postdoc expectations by funding agencies and national organizations. Compared with other postdoc items, relatively small percentages of coordinators indicated that their institution required a recently awarded doctorate or publications in scholarly journals. One possibility is that the lower proportions are due to item wording. For example, coordinators may have different interpretations of the term “recent.” Alternately, recency of degree may be common among postdocs but may not be a requirement for the position. Similarly, the phrase “require publication in a scholarly journal” may be too strong given the difficulties of getting articles published in top-tier journals. However, many institutions may expect postdocs to submit articles to journals of any stature for review. In future surveys, NCSSES and other organizations may want to revise or remove recency of doctoral award and publication requirements to improve alignment with institutional definitions and expectations.

Data Source and Limitations

Conducted since 1966, the GSS is an annual census of all academic institutions in the United States that grant research-based master’s or doctoral degrees in SEH fields. The 2016 GSS collected data from 15,853 organizational units (departments, programs, affiliated research centers, and health care facilities) at 714 eligible institutions and their affiliates in the United States, Puerto Rico, and Guam. The unit response rate was 99.5%. In 2016, the GSS reported there were approximately 620,000 students, 65,000 postdoctoral appointees, and 26,000 doctorate-holding nonfaculty researchers in SEH programs at U.S. academic institutions. An overview of the GSS is available at <https://www.nsf.gov/statistics/srvygradpostdoc/>.

GSS health fields are collected under the advisement of NIH. These GSS fields are about one-third of all health fields in the U.S. Department of Education’s Classification of Instructional Programs (CIP) taxonomy. NIH information on trends seen within these selected health fields can be found at <https://report.nih.gov/nihdatabook/>.

In 2014, the survey frame was updated following a comprehensive frame evaluation study. A total of 151 newly eligible institutions were added, and two private for-profit institutions offering mostly practitioner-based graduate degrees were determined to be ineligible. This 2014 frame update added over the previous frame a total of 15,848 SEH graduate students, an increase of 2.4%; 1,214 SEH postdocs, an increase of 1.9%; and 416 SEH NFRs, an increase of 1.8%. Because of the survey frame update, data comparisons across years should be made with caution. This is especially true for counts; however, proportions or shares are typically robust enough to allow for such comparisons. In this report, the data

comparisons between 2014 and earlier years use the “2014old” data, and those between 2014 and 2016 use the “2014new” data. The effect of the frame update can be evaluated by using the “2014old” and “2014new” data. For more information on the survey frame update, see the special report *Assessing the Impact of Frame Changes on Trend Data from the Survey of Graduate Students and Postdoctorates in Science and Engineering*.¹²

The postdoc definition items were asked of coordinators who reported postdocs between 2010 and 2016. The number of coordinators responding varied by year; the overall response rates for these items were always over 96%. **Table 4** provides the number of coordinators who were asked the postdoc items in each year, as well as the number of responses and response rate by year. Overall, there were 567 unique responses used in the analyses.

Table 4

Responses for the postdoc items, by item and year

(Number and percent)

Items	2010	2011	2012	2013	2014new	2015	2016	All years
Coordinators who were asked the postdoc items (number)	447	552	565	473	466	463	482	3,448
Responded to any postdoc items (number)	440	550	559	465	458	457	467	3,396
Responded to all postdoc items (number)	430	548	557	464	458	457	466	3,380
Response rate, completed all items (%)	96.2	99.3	98.6	98.1	98.3	98.7	96.7	98
Number used in the analysis (most recent complete data)	2	4	39	21	23	12	466	567

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Notes

- 1 National Center for Science and Engineering Statistics (NCSES). 2018. *Survey of Graduate Students and Postdoctorates in Science and Engineering, Fall 2016*. Data Table 27. Alexandria, VA: National Science Foundation. Available at https://ncesdata.nsf.gov/gradpostdoc/2016/html/GSS2016_DST_27.html.
- 2 National Academies of Sciences, Engineering, and Medicine. 2018. *Measuring the 21st Century Science and Engineering Workforce Population: Evolving Needs*. Washington, DC: National Academies Press. Available at <https://doi.org/10.17226/24968>.
- 3 National Institutes of Health. 2012. *Biomedical Research Workforce Working Group Report*. Bethesda, MD. Available at https://acd.od.nih.gov/documents/reports/Biomedical_research_wgreport.pdf.
- 4 National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. 2014. *The Postdoctoral Experience Revisited*. Washington, DC: National Academies Press. Available at <https://doi.org/10.17226/18982>.
- 5 National Postdoctoral Association. 2017. *Supporting the Needs of Postdocs: 2017 National Postdoctoral Association Institutional Policy Report*. Rockville, MD. Available at https://www.sigmaxi.org/docs/default-source/Publications-Documents/2017_supporting_the_needs_of_postdocs.pdf?sfvrsn=81c9b858_12.
- 6 Phou K. 2010. *Postdoc Data Project/Early Career Doctorates*. Presentation at the Council of Graduate Schools (CGS) Research and Policy Forum. Washington, DC, 22 September. Available at http://cgsnet.org/ckfinder/userfiles/files/Phou_9-22-10.pdf.
- 7 Ruiz Bravo N, Olsen KL. 2007. NIH-NSF definition of postdoctoral scholar [letter to Reed A], 29 January. https://grants.nih.gov/training/Reed_Letter.pdf. The NPA definition is very similar: “A postdoctoral scholar (‘postdoc’) is an individual holding a doctoral degree who is engaged in a temporary period of mentored research and/or scholarly training for the purpose of acquiring the professional skills needed to pursue a career path of his or her choosing” (http://www.nationalpostdoc.org/?page=What_is_a_postdoc).

8 The exact wording of the survey items is as follows:

Listed below are common characteristics of postdocs used by different organizations. Which of the following are characteristics of postdoc requirements at your institution?

- a. Requires a PhD or an equivalent doctoral degree (such as a ScD, MD, DVM, or DDS)?
- b. Requires that the doctorate was recently awarded?
- c. Is a temporary position?
- d. Is intended to provide training in research?
- e. Is intended to advance professional skills?
- f. Requires a full-time commitment to research?
- g. Requires that the postdoc work under the direction of a senior scholar?
- h. Is for a defined period of time (i.e., has a term limit)?
- i. Requires publication of research in scholarly journals?
- j. Requires mentorship for professional development?
- k. Is intended to prepare the postdoc for an independent career in research?

In addition to these items, coordinators were asked if their institution had a formal postdoc definition that was used by all responding units. Response rates for these items were very high (over 96% in each year). After the first year responding to the items, the responses were preloaded each year, and coordinators were asked to verify their prior input. While this preloading led to high response rates, there was the possibility that coordinators were not sufficiently reviewing their responses each year.

9 Units are departments, institutes, laboratories, research centers, health care facilities, and other organizations at the academic institution that appoint postdoctoral researchers and are reported by field of research to the GSS.

10 Carnegie Classifications categorize accredited institutions based on the degree levels awarded, size of programs, research activity (including research expenditures and staffing), and institutional focus (such as general, medical schools and centers, and engineering schools).

For more information on the Carnegie Classification as it pertains to institutions that award doctorates, see: Kosar R, Scott DW. 2018. Examining the Carnegie Classification Methodology for Research Universities. *Statistics and Public Policy* 5(1):1–12. DOI:10.1080/2330443X.2018.1442271. Available at <https://doi.org/10.1080/2330443X.2018.1442271>. The website for the current Carnegie Classification methodology (which was updated in 2018) is <https://carnegieclassifications.iu.edu/>.

11 Davis G. 2005. Doctors without orders: highlights of the Sigma Xi postdoc survey. *American Scientist* 93(3), S1+.

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