



# Does Postdoctoral Training Raise the Likelihood of Pursuing a Career in Research and Development?

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Investments in Early Career Scientists: Graduate Students and Postdocs  
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National Science Foundation

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# Disclaimer

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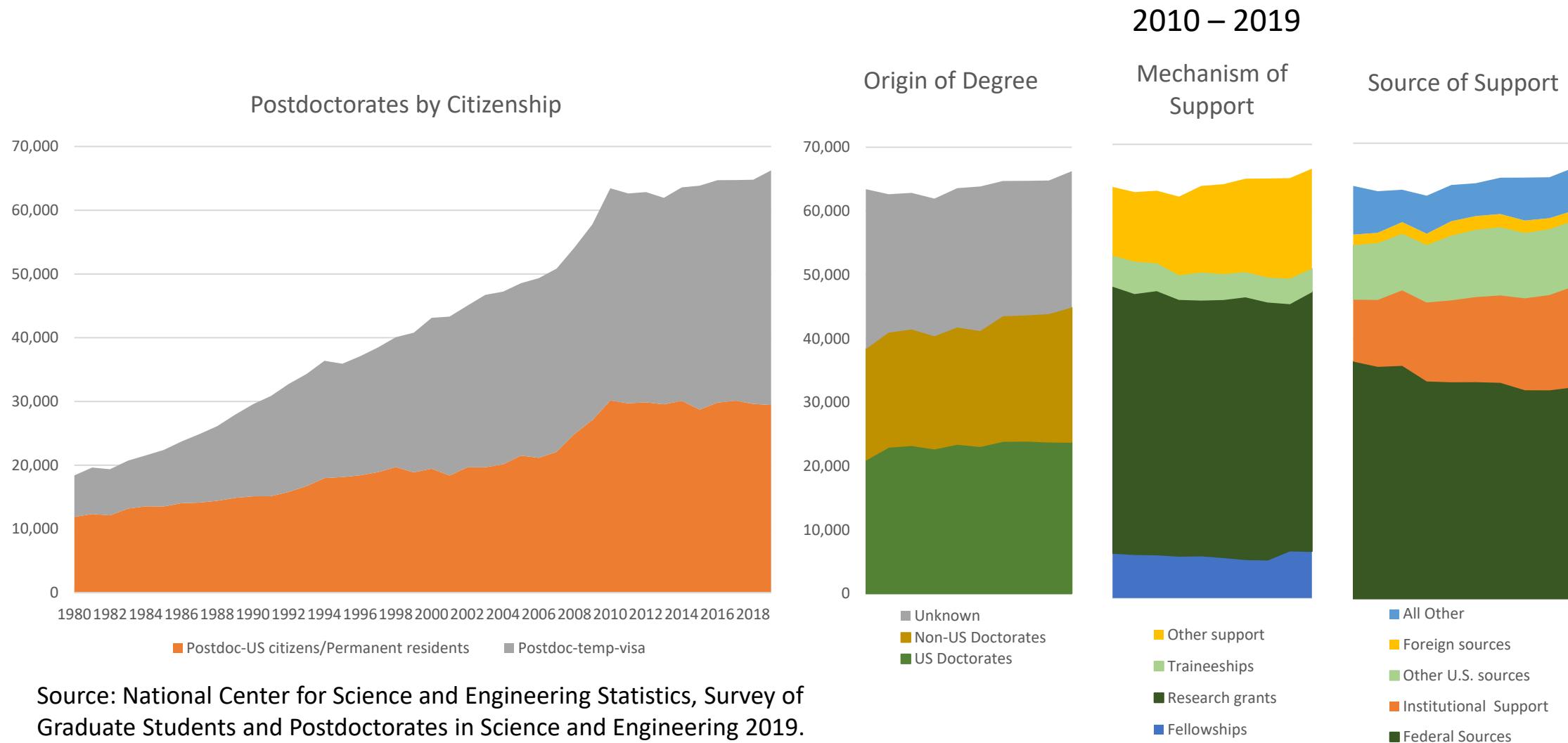
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# Outline

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- Highlights of NCSES data on postdocs
- New insights from the Early Career Doctorates Survey
- Define career in research and development, and identify influential factors
- Findings from regression analyses
- Discussions

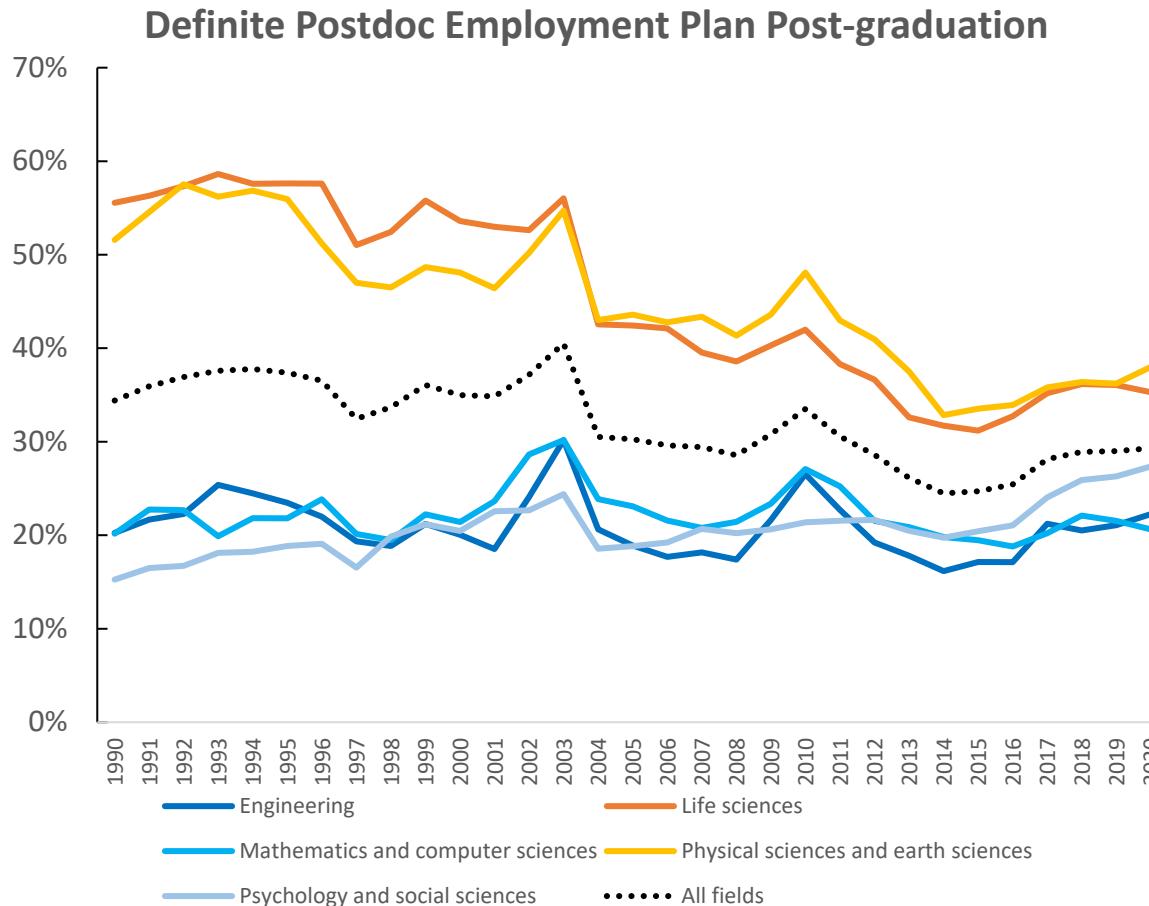
# Trends of postdoctorates - Survey of Graduate Students and Postdoctorates in Science and Engineering



# Committing to postdoc immediately after graduation

## - Survey of Earned Doctorates

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The trend of pursuing postdoctoral positions immediately after completing doctoral training has declined for Life Sciences and Physical & Earth Sciences over time, while the trend remains stable at much lower rates, below overall average, for other fields. In recent years, about 30% of graduates indicated committing to postdoc or further training immediately after completing their doctorates.

Source: National Center for Science and Engineering Statistics, Survey of Earned Doctorates 1990 - 2020

# New insights from the Early Career Doctorates Survey

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## Target Population

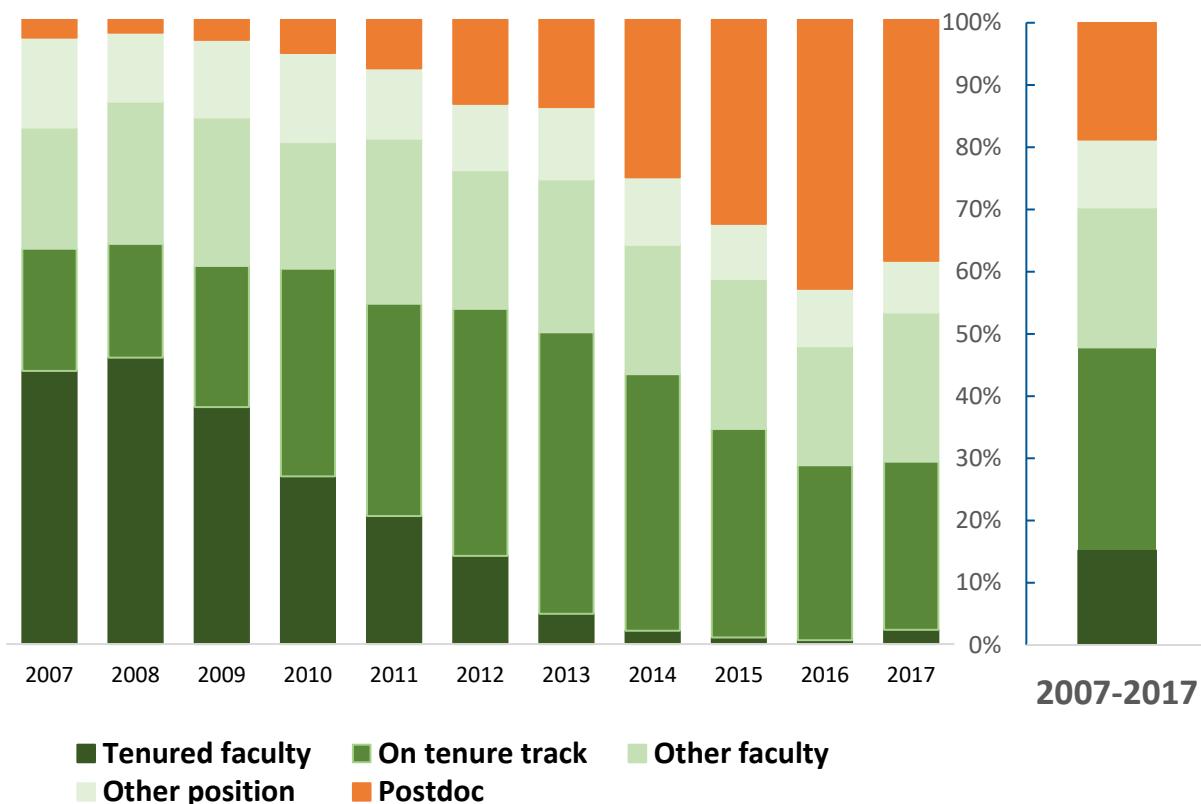
- Individuals who earned their first doctorate or equivalent degree in the last 10 years
  - Postdocs
  - Faculty
  - Nonfaculty researchers
  - Administrators
- Working at:
  - U.S. academic institutions (doctorate and master's granting)
  - Federally funded research and development centers
  - National Institutes of Health Intramural Research Programs

## Questionnaire Contents

- Educational history
- Professional activities
- Employment
- Work and personal life
- Career development and plans
- Demographics

# Early career doctorates in academia – moving out of postdoc and up the ladder during the first 10 years

Position Type in 2017 by Doctorate Award Year



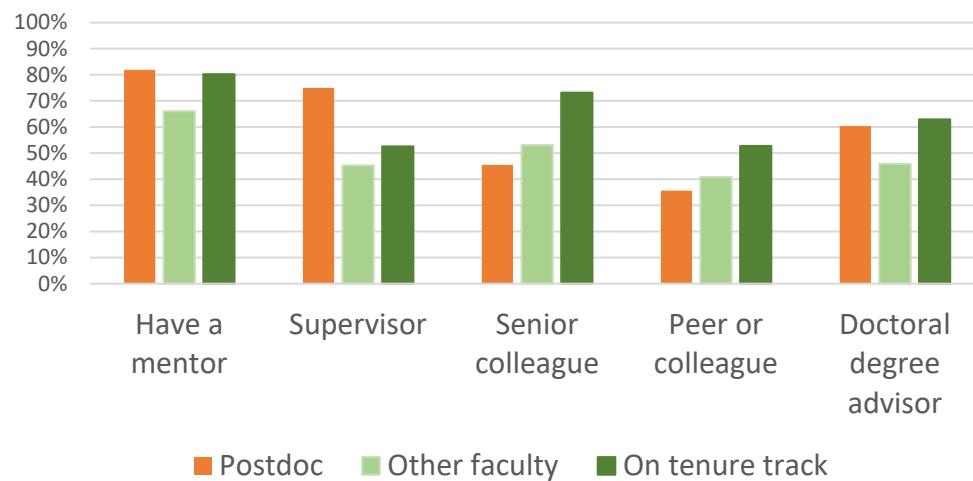
Among early career doctorates working at academic institutions during the week of October 1<sup>st</sup>, 2017, 70% were in faculty positions while 19% were postdocs and 11% in all other positions. Tenured faculty and tenure-track faculty accounted for 48%.

Early career doctorates were more likely to hold postdoc positions the closer they were to their doctorate award year. Almost 83% of postdocs earned their doctorate between 2013-2017 while 93% of tenured faculty earned their doctorate between 2007 – 2012.

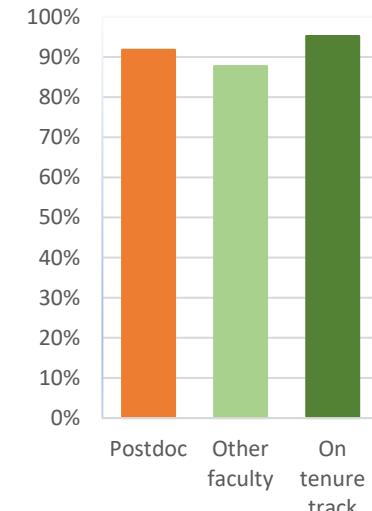
Source: National Center for Science and Engineering Statistics, Early Career Doctorates Survey 2017

# Career advisors and mentors of early career doctorates

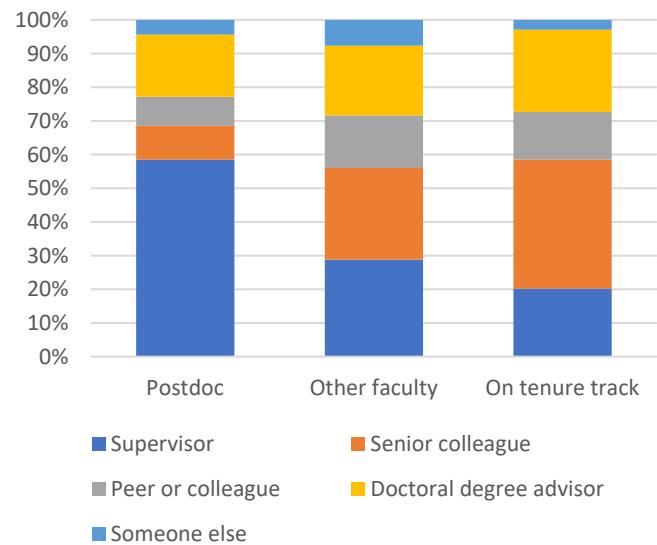
Early career doctorates with a mentor or individuals who they considered to be their mentors



Have career advisor



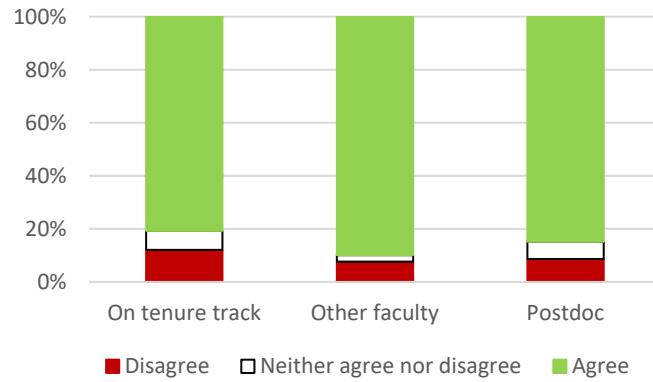
Primary career advisors of early career doctorates



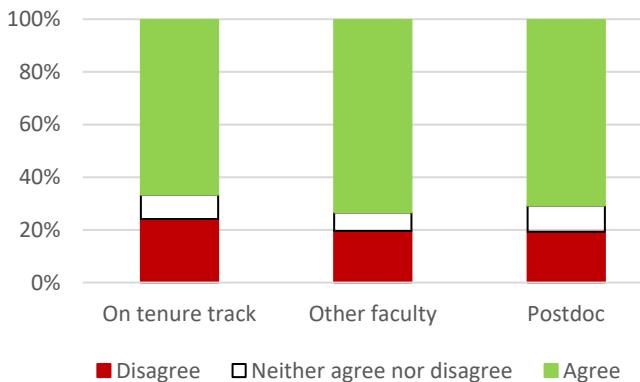
Source: National Center for Science and Engineering Statistics, Early Career Doctorates Survey 2017

# Work-life balance and job satisfaction of early career doctorates covering 2013 to 2017 doctorate award years

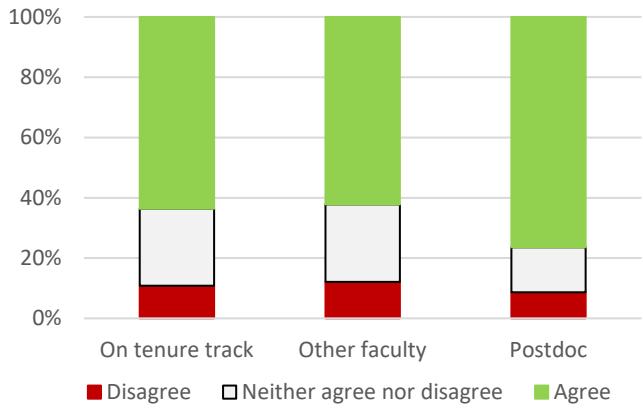
Able to manage demands of position



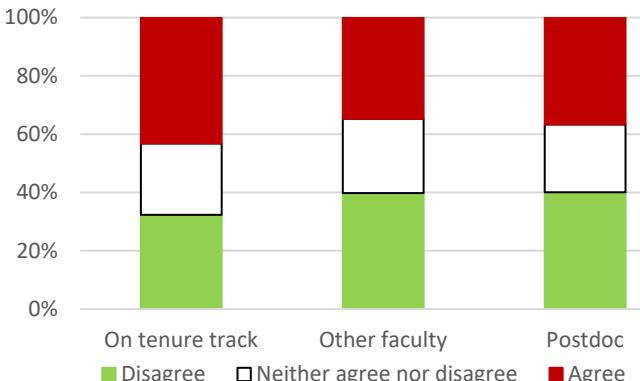
Work schedule allowed maintenance of desired quality of life



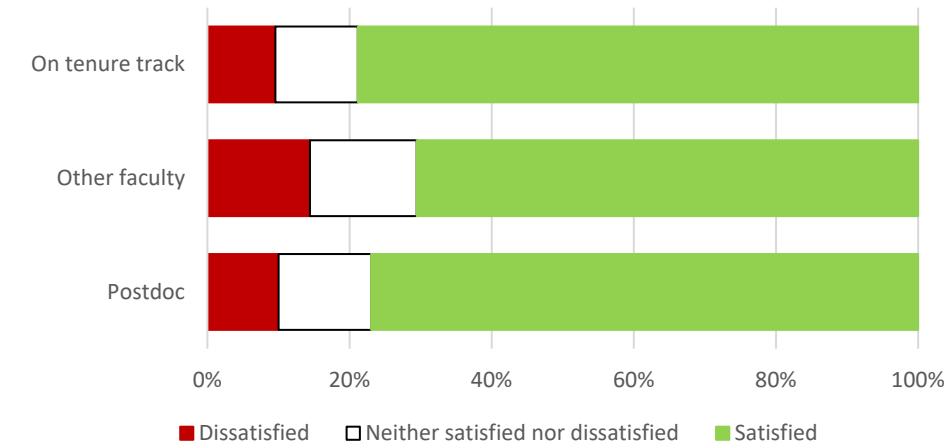
Supervisor understood relationship between personal and professional responsibilities



Demands at home have slowed progress of professional activities

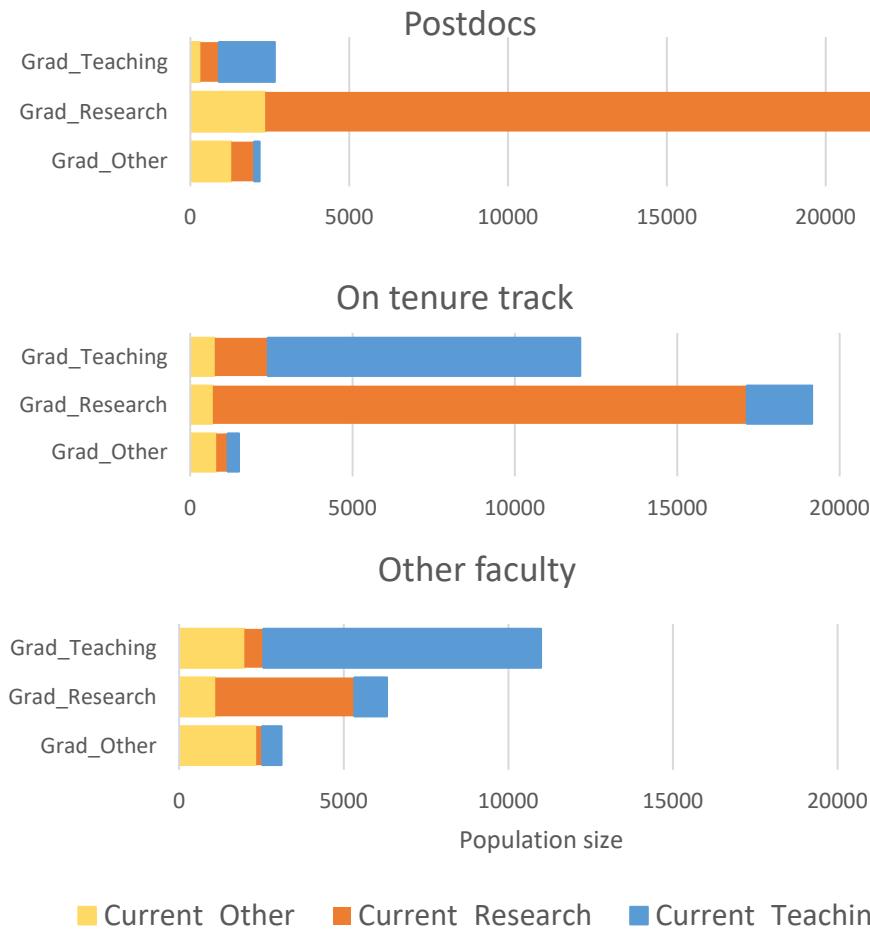


Satisfaction with job held in 2017



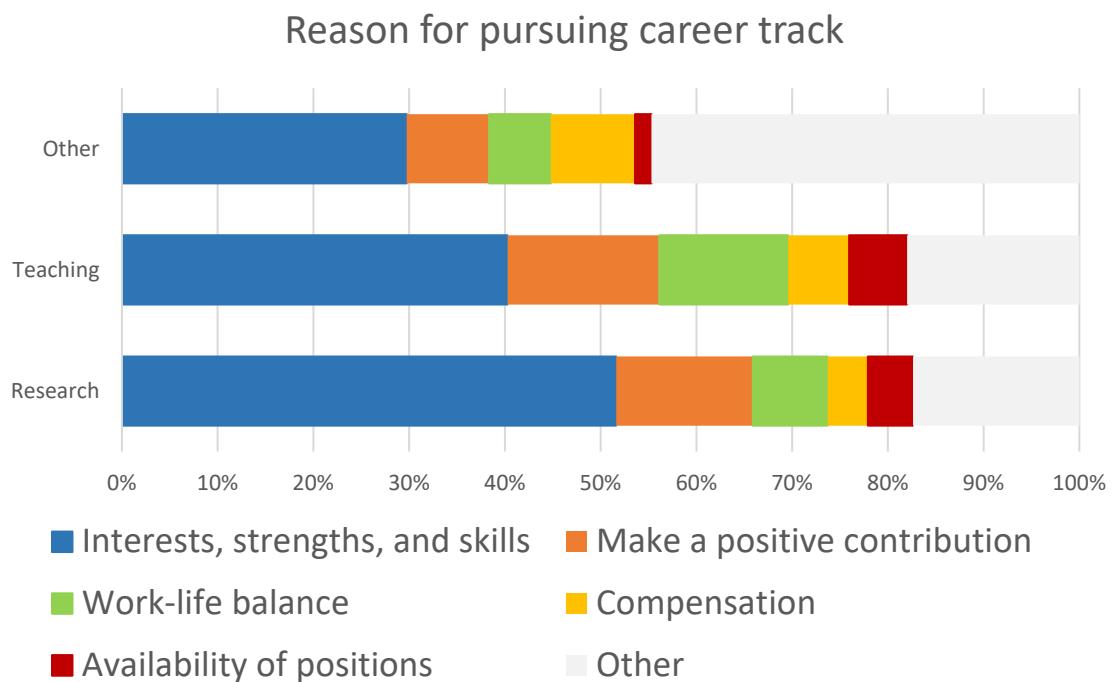
Source: National Center for Science and Engineering Statistics, Early Career Doctorates Survey 2017

# 83% of postdocs interested in pursuing research track at the time of earning their doctorate



Overall, 31.5% reported changing career track between the time of earning their doctorate and 2017.

Interests, strengths, and skills is the leading reason for pursuing career track.



Source: National Center for Science and Engineering Statistics, Early Career Doctorates Survey 2017

# Defining a career in research and development (R&D)

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NCSES education survey: Survey of Earned Doctorates (SED) offers an early indicator of pursuing career in R&D

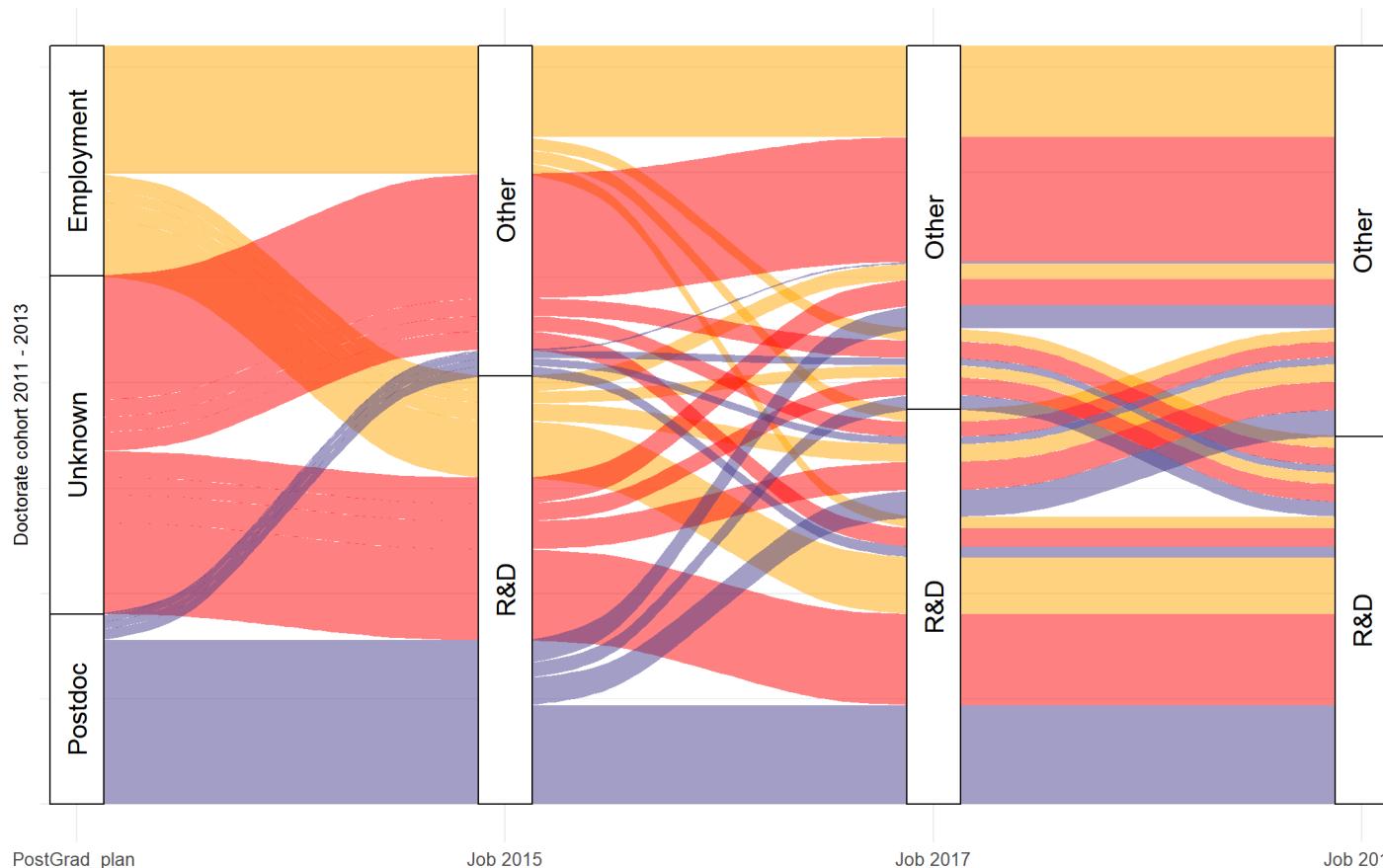
- Commitment to postdoc after graduation; primary work activity will be in R&D

NCSES workforce surveys: Survey of Doctorate Recipients (SDR) offers multiple job characteristics for defining career in R&D

- Primary work activities on principal job (basic research, applied research, development, design of equipment, processes, structure, models)
- Employment sector (academia vs. other sectors)
- Tenure status and faculty rank
- Work supported by contracts or grants from Federal government
- The extent to which the job is related to doctoral field of study

Recently developed SDR-WoS linked data offer longitudinal data on scientific publication output, simplifying tracking career development in R&D

# Early Indicator and employment outcome – first seven years post-graduation



Employment commitment immediately post-graduation as an early indicator is associated with propensity of performing R&D in future jobs. For the graduating cohort (AY 2011-2013), among those who started out in postdoc, 69% are working in R&D jobs (defined by reported primary work activities) in 2019, and 52% reported holding R&D jobs continuously from 2015 – 2019.

Source: National Center for Science and Engineering Statistics, Survey of Doctorate Recipients 2015, 2017, and 2019

# Identify factors influencing future research propensity

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- Background and demographics  
Sex, Race/Ethnicity, Citizenship, Marital status, Parental education, Live with young children, undergraduate institution type
- Graduate training and support  
Source of graduate support, Graduate debt, Carnegie classification of Doctorate institution, doctorate field of study, Pre-doctorate publications
- Early indicators (self-reported post-graduation plan)
- Scientific publication output  
Characteristics of publication produced 1-5 years post-PhD, publication produced 6-10 years post-PhD

# Top factors influencing propensity to perform R&D

	7 years post graduation	12 years post graduation
Sex	Men > Women	Men > Women
Race/Ethnicity	Asian > White	<b>Asian &gt; White</b>
Citizenship		Temp visa holder > U.S. citizen
Marital Status		
Parental Education		
Young Children		
BA Institution Type	Other, RU/VH > All other	
PhD Institution Type	RU/VH > All other	
PhD Field	<b>Comp, Psych &lt; All other</b>	<b>Comp, Math &lt; All other</b>
Graduate Support Source	<b>Fellowship, RA &gt; TA, Own/Loan</b>	<b>RA &gt; TA, Own/Loan</b>
Graduate Debt	Unknown > None, Some	
Pre-PhD Publication		
Post-graduation Plan	<b>Postdoc &gt; Non-postdoc</b>	Postdoc > Non-postdoc
Post-graduation Location	U.S. > Non-U.S.	U.S. > Non-U.S.
Post-PhD Publication YR 1-5	<b>Have &gt; None</b>	
Post-PhD Publication YR 6-10		<b>Have &gt; None</b>

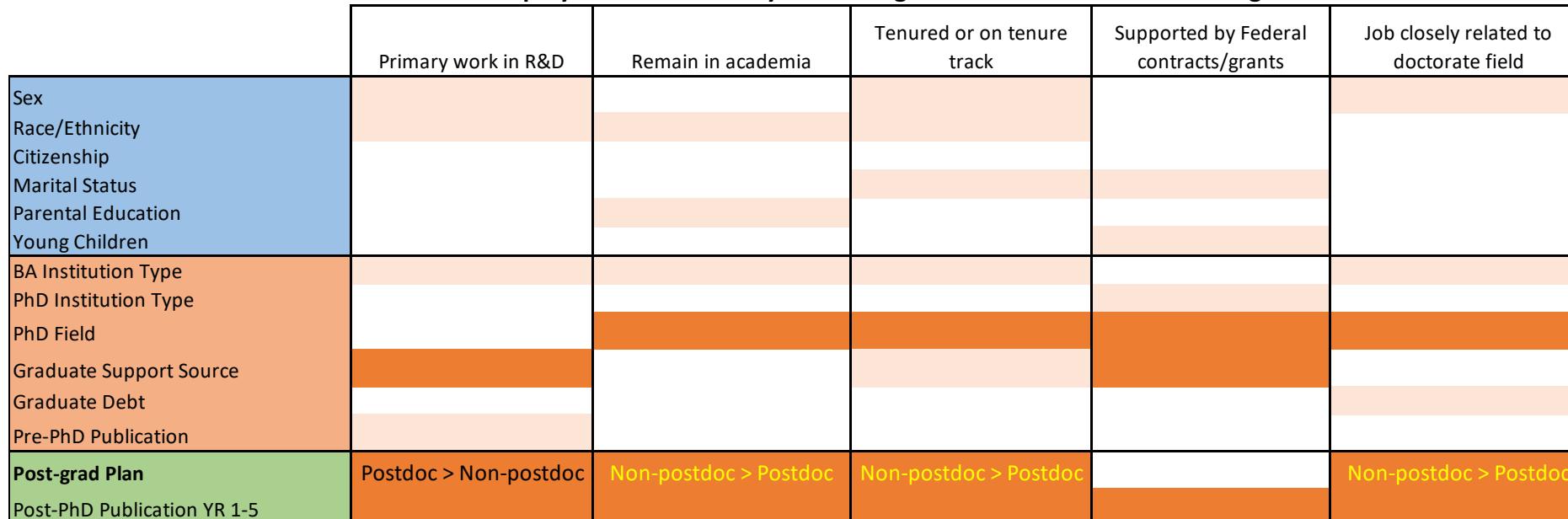
Logistic regression is used to examine the role of various factors in influencing career path choices in R&D (indicated by a dichotomous indicator of working activities are primarily R&D). The cohort, AY 2006-2008 , is used to examine outcomes at 12 years post-PhD, and the cohort, AY 2011-2013 for outcome at 7 years post-PhD using the SDR 2019 for outcome measures.

The indicators of having at least one publication and having at least one non-US coauthor are among the top factors. When publication indicators from more recent period are included in the model, earlier indicators become less influential.

# Those who started out with definite commitment in academia

Postdoctoral experience is a strong and positive factor for staying on R&D performing jobs. However, among PhDs with definite commitment in academia, those who started out in non-postdoc positions performed better in terms of holding on a job in academia or obtaining tenure or tenure-track.

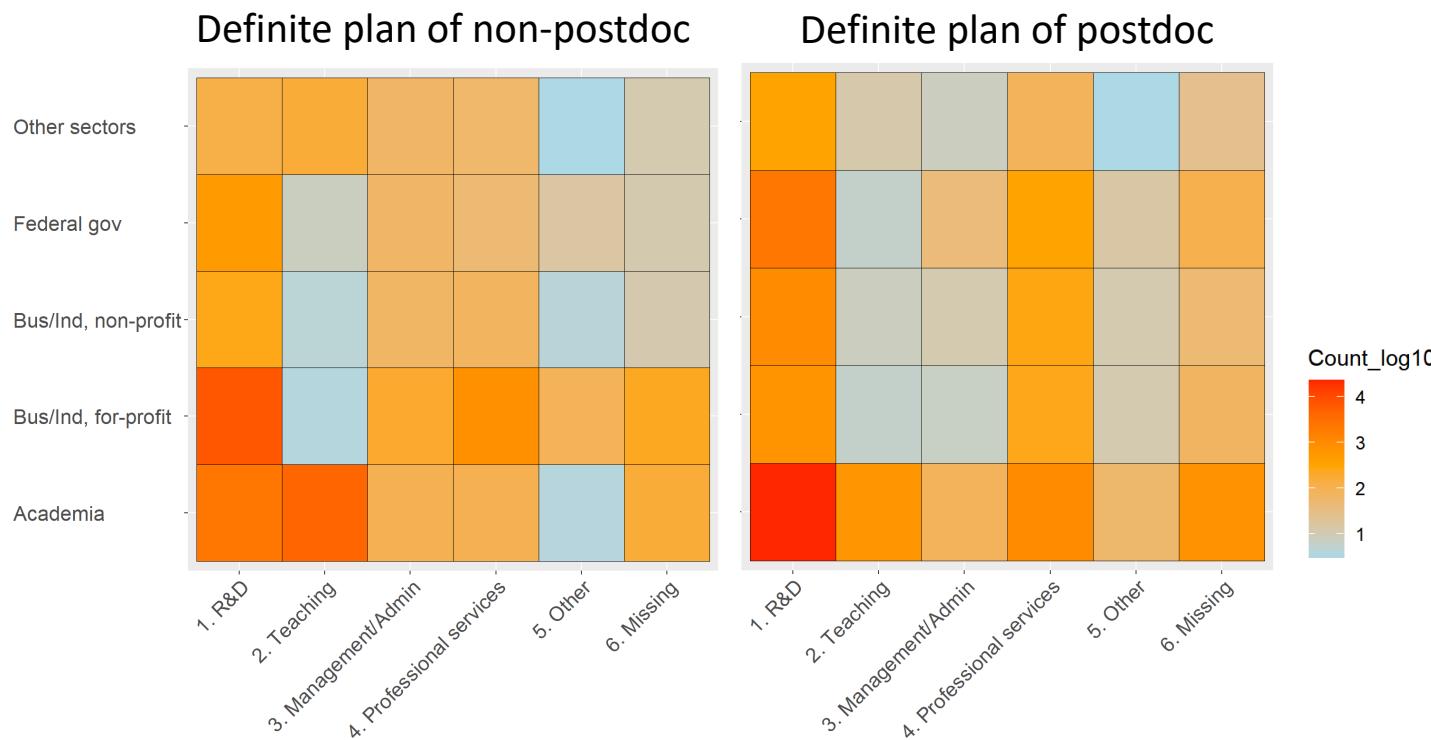
Employment outcome 7 years after graduation - Cohort 2011-2013 graduates at 2019



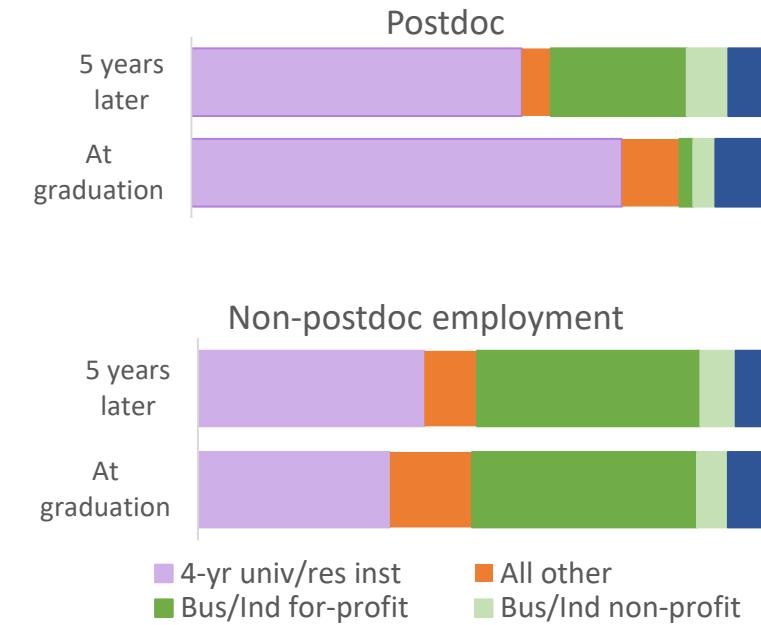
# Career aspiration in the face of the reality of job market

Employer sector and primary work activities – post-graduation

Cohort: AY 2011 – 2013

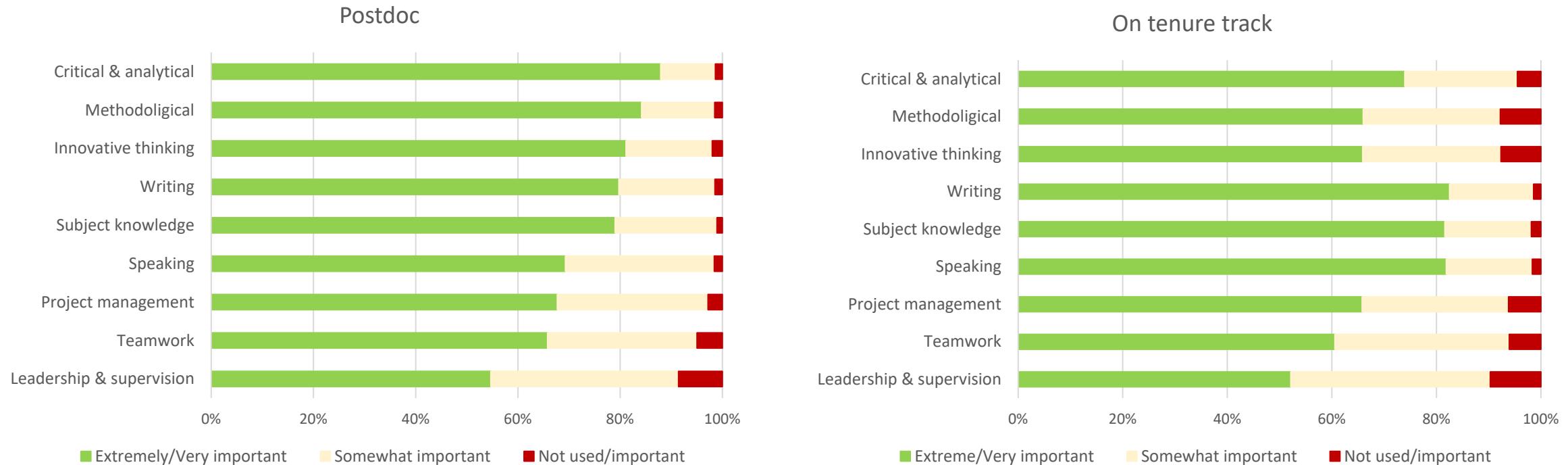


Source: National Center for Science and Engineering Statistics, Survey of Earned Doctorates 2011 - 2013



Source: National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2017

# Importance of skills to current position

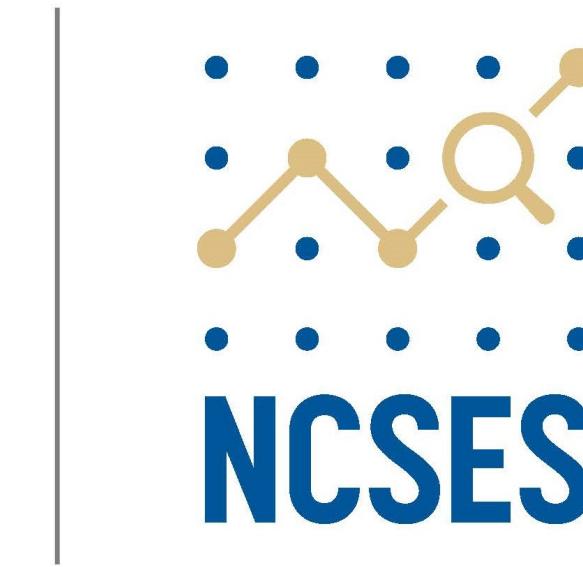


Source: National Center for Science and Engineering Statistics, Early Career  
Doctorates Survey 2017

# Discussion

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- Research on factors that are associated with the transitioning to postdoc positions and from postdoc to R&D jobs is beginning to emerge
- The rich source of data for US postdocs are NCSES surveys
- Literature suggests demographic factors, publication history (success), and postdoc experience influence transition to R&D positions
- We explore the relationship of publication history and demographic characteristics with the likelihood of postdocs transitioning to R&D positions



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