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Predictors of Neurosurgical Academic Placement and Research Productivity: A Systematic Review

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 29 April 2026 and was last updated on 29 April 2026.

INTRODUCTION

Review question / Objective In neurosurgery trainees and faculty, what pre-residency, residency, and post-residency factors are most strongly associated with academic career placement and research productivity?

Rationale The centralization of neurosurgical care in academic centers and changes to the neurosurgery residency application have fueled interest in identifying predictors of academic career placement and research productivity. This systematic review synthesizes factors associated with academic career choice and research productivity across the training-to-faculty pipeline, including pre-residency, residency, and post-residency factors.

Condition being studied No health condition or disease is being studied in this review. It is a review of neurosurgical training and the factors that predict a career in academic neurosurgery.

METHODS

Search strategy PUBMED/MEDLINE search terms:

("Neurosurgery"[MeSH Terms] OR neurosurg*[Title/Abstract] OR "neurological surgery"[Title/Abstract]) AND

("Career Choice"[MeSH Terms] OR "Faculty, Medical"[MeSH Terms] OR "Academic Success"[MeSH Terms] OR academia*[Title/Abstract] OR "academic career"[Title/Abstract] OR "academic placement"[Title/Abstract] OR faculty[Title/Abstract] OR "academic appointment"[Title/Abstract]) AND

("Education, Medical"[MeSH Terms] OR "Students, Medical"[MeSH Terms] OR "Education, Medical, Undergraduate"[MeSH Terms] OR "Education, Medical, Graduate"[MeSH Terms] OR "Internship and Residency"[MeSH Terms] OR "Fellowships and Scholarships"[MeSH Terms] OR "Mentors"[MeSH Terms] OR "medical school"[Title/Abstract] OR "medical student"[Title/Abstract] OR residency[Title/Abstract] OR fellowsh*[Title/Abstract])

Abstract] OR mentorship[Title/Abstract] OR "protected time"[Title/Abstract] OR "research time"[Title/Abstract] OR "pre-medical"[Title/Abstract] OR premed[Title/Abstract])
 AND
 (Journal Article[Publication Type])
 AND
 (English[Language])
 AND
 (Humans[MeSH Terms])
 NOT
 (Editorial[Publication Type] OR Letter[Publication Type] OR Comment[Publication Type] OR Case Reports[Publication Type] OR Congress[Publication Type] OR Review[Publication Type])

SCOPUS search terms:

(TITLE-ABS-KEY (neurosurg* OR "neurological surgery"))
 AND
 (TITLE-ABS-KEY (academia* OR "academic career" OR "academic placement" OR faculty OR "academic appointment" OR "career choice" OR "academic success"))
 AND
 (TITLE-ABS-KEY ("medical education" OR "medical school" OR "medical student" OR residency OR fellowsh* OR mentorship OR mentor* OR "protected time" OR "research time" OR "pre-medical" OR premed OR internship))

Embase:

('neurosurgery'/exp OR neurosurg*:ti,ab OR 'neurological surgery':ti,ab)
 AND
 ('career'/exp OR 'medical staff'/exp OR 'academic achievement'/exp OR academia*:ti,ab OR 'academic career':ti,ab OR 'academic placement':ti,ab OR faculty:ti,ab OR 'academic appointment':ti,ab)
 AND
 ('medical education'/exp OR 'medical student'/exp OR 'undergraduate medical education'/exp OR 'graduate medical education'/exp OR 'residency education'/exp OR 'fellowship'/exp OR 'mentor'/exp OR 'medical school':ti,ab OR 'medical student':ti,ab OR residency:ti,ab OR fellowsh*:ti,ab OR mentorship:ti,ab OR 'protected time':ti,ab OR 'research time':ti,ab OR 'pre-medical':ti,ab OR premed:ti,ab)
 AND [article]/lim
 AND [english]/lim
 AND [humans]/lim
 AND [2006-2026]/py
 NOT ([conference abstract]/lim OR [conference paper]/lim OR [letter]/lim OR [editorial]/lim OR [review]/lim OR [case report]/lim).

Participant or population We are studying Neurosurgeons in academic and private/non-academic settings.

Intervention There is no particular intervention being investigated, rather we are finding factors across their training that may be predictive of a career in academic neurosurgery.

Comparator No comparative intervention is being used.

Study designs to be included Retrospective cohort studies, cross-sectional studies, bibliometric analyses.

Eligibility criteria Studies were eligible for inclusion if they included novel original empirical findings examining 1) predictors of academic career placement and/or research productivity (h-index, publication count, NIH funding, etc.) and 2) had a population of neurosurgeons and/or neurosurgical trainees. Studies were excluded if any of the following criteria were met: 1) published in languages other than English, 2) categorized as editorials, letters, commentaries, conference abstracts, case reports, descriptive studies and/or review articles, 3) focused on international medical school graduates either practicing or training in the United States exclusively, due to significant differences in pre-residency training.

Information sources We used online databases: PUBMED (MEDLINE), Embase, and Scopus.

Main outcome(s) Academic career placement, defined as post-training employment at an academic medical center or university-affiliated institution, and measured as a binary outcome (academic vs. non-academic placement); reported as proportions and odds ratios from univariable and multivariable logistic regression models.

Additional outcome(s) Research productivity, operationalized through bibliometric measures (h-index, total publication count, first-author publication count, basic science publication count, comprehensive clinical publication count) and funding-based measures (NIH funding receipt, K-award attainment, NIH grants per capita, academic rank attainment).

Data management Records of search results from our three databases were uploaded to Covidence for data management and automated duplication removal. Two reviewers screened titles and abstracts for relevance, with disagreements

resolved through discussion and consensus. Studies advancing to full-text review were independently assessed for eligibility by two reviewers, with disagreements again resolved by consensus. Relevant data were extracted independently by two reviewers using a structured extraction approach capturing study design, population characteristics, training stage, predictor tested, outcomes measured, and relevant associations. Risk of bias was assessed independently by two reviewers using the Newcastle-Ottawa Scale within the same platform, and disagreements on scoring areas were resolved by consensus.

Author 6 - Eric Oermann - Author 6 was also instrumental in providing feedback, reviewing the draft, and providing perspectives as an attending physician.

Quality assessment / Risk of bias analysis The Newcastle-Ottawa criteria was used to evaluate risk of bias.

Strategy of data synthesis The data was analyzed qualitatively rather than quantitatively due to heterogeneity in the exposure and outcome definitions. Data was synthesized and extracted in a table and described qualitatively.

Subgroup analysis No subgroup analyses were conducted.

Sensitivity analysis No sensitivity analyses were conducted.

Language restriction Yes, only studies in English and focusing on the US training pipeline will be reviewed.

Country(ies) involved United States.

Keywords Neurosurgery, academic placement, research productivity.

Contributions of each author

Author 1 - Ariel Arias - Author 1 drafted the manuscript and worked on study collection.

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Author 2 - Jack Markert - Author 2 also helped in the drafting of the manuscript and collecting and screening studies.

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Author 5 - Daniel Orringer - Author 5 provided feedback and support as an attending physician in the field.