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# Research in Medical School Impact on Career Path

Rachel K. Wolfson, MD
Associate Professor, Pediatric Critical Care
Assistant Dean for Medical School Research
The University of Chicago Pritzker School of Medicine

# Objectives:

- Understand the landscape of medical student research participation
- Consider the impact that research participation has on student career trajectory
- Consider gaps in our understanding of how Residency Program Directors regard meaningful scholarly work in evaluating applicants

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# Research During Medical School

- Increasingly common, in parallel with the 4-year curriculum
- Often supported by structured Scholarly Concentrations Programs
  - Protected time
  - Identify mentors
  - Benchmarks for completion

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# Scholarly Concentrations Programs

- Optional vs required
- Protected time
- Deliverables
- Tracks

**Basic Science**

**Translational Science**

**Clinical Research**

**Healthcare Delivery**

**Medical Education**

**Community Health**

**Global Health**

**Social Science**

**Medical Humanities**

**Health Policy**

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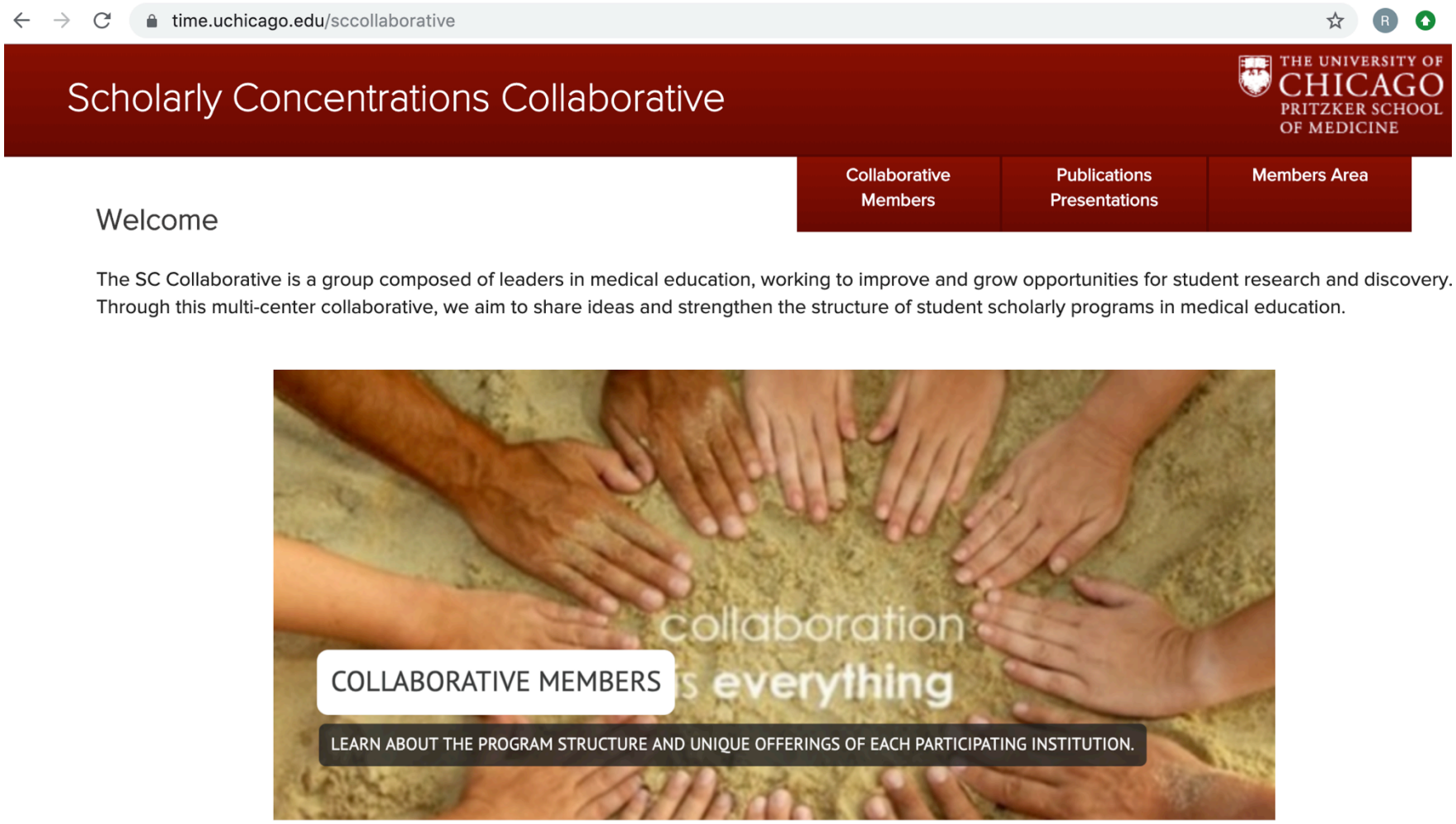
# Scholarly Concentrations Collaborative

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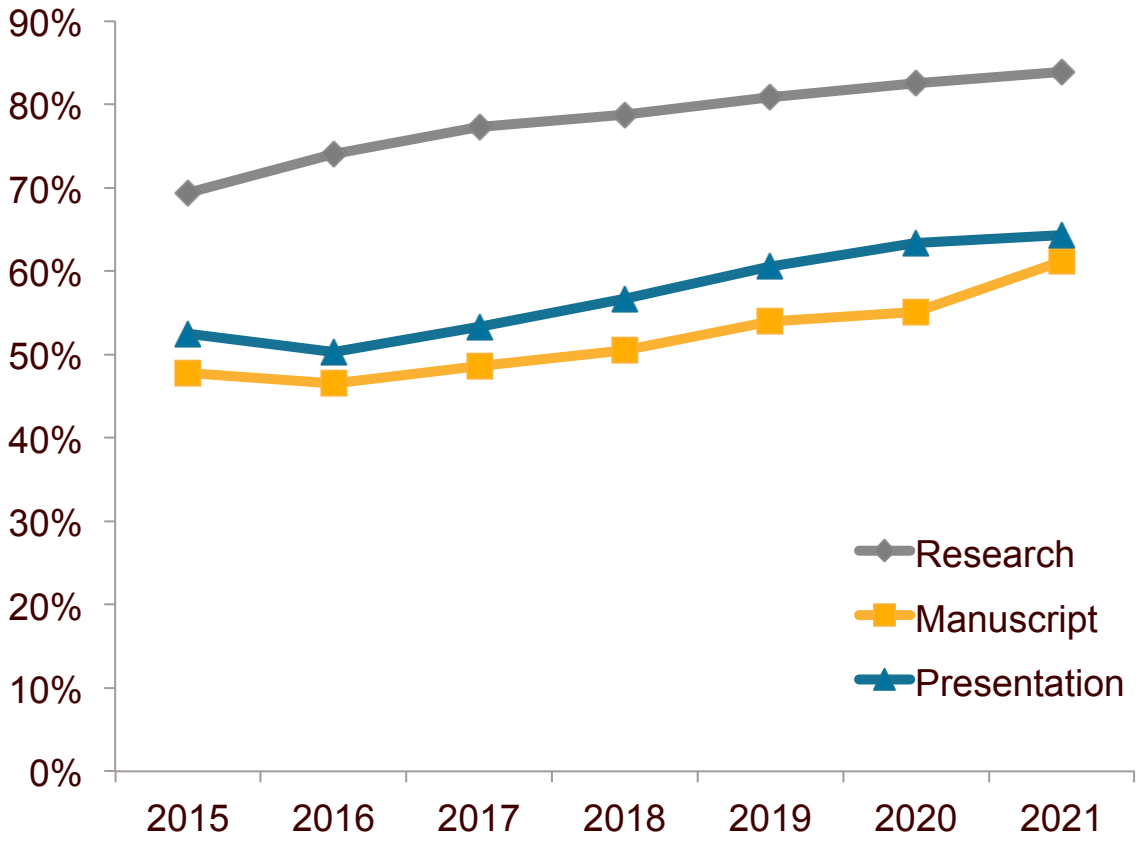
sccollaborative.uchicago.edu

# Research During Medical School

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https://www.aamc.org/media/55736/download
https://www.aamc.org/media/33566/download
AAMC Medical School Graduation Questionnaire 2021 and 2019 All Schools Summary Reports

# Scholarly Concentration Programs *Student Outcomes*

## Impact of Professional Student Mentored Research Fellowship on Medical Education and Academic Medicine Career Path

Christopher James Areephanthu, B.S.[1,*], Raevti Bole, M.A.[1,*], Terry Stratton, Ph.D.[2], Thomas H. Kelly, Ph.D.[2], Catherine P. Starnes, M.S.[3], and B. Peter Sawaya, M.D.[4]

- University of Kentucky (2007-2012)
- Professional Student Mentored Research Fellowship (PSMRF)
  - Authored more **papers**
  - More likely to be selected for **AOA**
  - More likely to **match** to programs at top-25 research residency programs
  - More likely to **match** into competitive specialties

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Clin Trans Sci 2015. 8: 479-483.

# Scholarly Concentration Programs *Student Outcomes*

**The Impact of a Scholarly Concentration Program on Student Interest in Career-Long Research: A Longitudinal Study**

Rachel K. Wolfson, MD, Kurt Alberson, Michael McGinty, Korry Schwanz, MHA, Kirsten Dickins, RN, MSW, and Vineet M. Arora, MD, MAPP

AAMC

**How extensively do you expect to be involved in research during your medical career?**

Exclusively
Significantly involved
Somewhat involved
Involved in a limited way
Not involved

→ "Change score" from matriculation to graduation

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*Acad Med* 2017. 92(8): 1196-1203.

Table 3

**Ordinal Logistic Regressions Including Dissemination for 125 Graduating Students, From a Study of Scholarly Concentration Program Satisfaction, Output, and Career Intent, University of Chicago Pritzker School of Medicine, 2014–2015**

| | All students | | | Low-interest matriculants (n = 73) | | | High-interest matriculants (n = 52) | | |
|---|---|---|---|---|---|---|---|---|---|
| Characteristic | Proportional OR of one-point-increased intent for research career | 95% CI | *P* value | Proportional OR of one-point-increased intent for research career | 95% CI | *P* value | Proportional OR of one-point-increased intent for research career | 95% CI | *P* value |
| Overall satisfaction | 1.80 | 1.11, 2.91 | .02 | 2.15 | 1.15, 4.02 | .02 | 0.72 | 0.30, 1.76 | .47 |
| Dissemination | 5.01 | 1.61, 15.62 | .005 | 5.95 | 1.30, 27.10 | .02 | 6.07 | 0.87, 42.53 | .07 |
| Female gender | 1.47 | 0.67, 3.27 | .34 | 1.05 | 0.40, 2.78 | .92 | 3.94 | 0.98, 15.76 | .05 |
| Baseline research interest | 0.07 | 0.03, 0.15 | < .001 | — | — | — | — | — | — |
| Basic science track | 0.88 | 0.27, 2.85 | .84 | 1.90 | 0.29, 12.34 | .50 | 0.28 | 0.06, 1.36 | .11 |
| Clinical research track | 1 | — | — | 1 | — | — | 1 | — | — |
| Social science track | 0.49 | 0.14, 1.71 | .27 | 2.38 | 0.41, 13.85 | .33 | 0.07 | 0.01, 0.56 | .02 |
| Medical education track | 0.58 | 0.16, 2.07 | .40 | 1.85 | 0.33, 10.50 | .49 | 0.32 | 0.04, 2.41 | .27 |
| Quality & safety track | 0.81 | 0.19, 3.47 | .78 | 2.63 | 0.46, 14.88 | .28 | 0.46 | 0.02, 9.41 | .61 |
| Community health track | 0.67 | 0.15, 2.99 | .60 | 3.56 | 0.65, 19.50 | .14 | 0.07 | 0.001, 3.96 | .19 |
| Global health track | 0.85 | 0.19, 3.86 | .83 | 2.71 | 0.36, 20.21 | .33 | 0.32 | 0.03, 3.17 | .32 |

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*Acad Med* 2017. 92(8): 1196-1203.

# Scholarly Concentration Programs *Student Outcomes*

**Scholarly Research Projects Benefit Medical Students' Research Productivity and Residency Choice: Outcomes From the University of Pittsburgh School of Medicine**

Molly B. Conroy, MD, MPH, Shahab Shaffiey, MD, MS, Sarah Jones, MD, MS, David J. Hackam, MD, PhD, Gwendolyn Sowa, MD, PhD, Daniel G. Winger, MS, Li Wang, MS, Michael L. Boninger, MD, Amy K. Wagner, MD, and Arthur S. Levine, MD

- Pre-implementation graduates (2006) vs post-implementation graduates (2008, 2010, 2012)
- Increased **publications**
- Increased **first-authorship**
- Greater proportion of students with publications **matched** into top tier residency programs

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Acad Med 2018. 93: 1727-1731.

# Scholarly Concentration Programs *Student Outcomes*

**George Washington University**
**2009-2018**

Students participating in the elective Clinical and Translational Research Scholarly Concentration (vs no Concentration:

- More likely to **match** in highly selective residency
- More likely to **publish** after medical school
- More likely to take **academic job**

*Radville et al. J Investig Med 2019; 67(6): 1018-23.*

**Johns Hopkins University**
**2014-2017**

SCP participation increased **research self-efficacy**

Increased post-SCP self-efficacy associated with:

- SCP satisfaction
- Mentor satisfaction
- Intent to conduct future research

*DiBiase et al. Med Educ Online 2020; 25(1): 1786210*

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# Mediating Workforce Disparities

**Do Research Activities During College, Medical School, and Residency Mediate Racial/Ethnic Disparities in Full-Time Faculty Appointments at U.S. Medical Schools?**

Donna B. Jeffe, PhD, Yan Yan, MD, PhD, and Dorothy A. Andriole, MD

- National retrospective cohort study
- Mediators explaining the effect of race/ethnicity on full-time faculty appointment:
  - **Participation in post-secondary research**
  - **Authorship during medical school**
  - Academic achievement
  - Faculty career intentions at graduation

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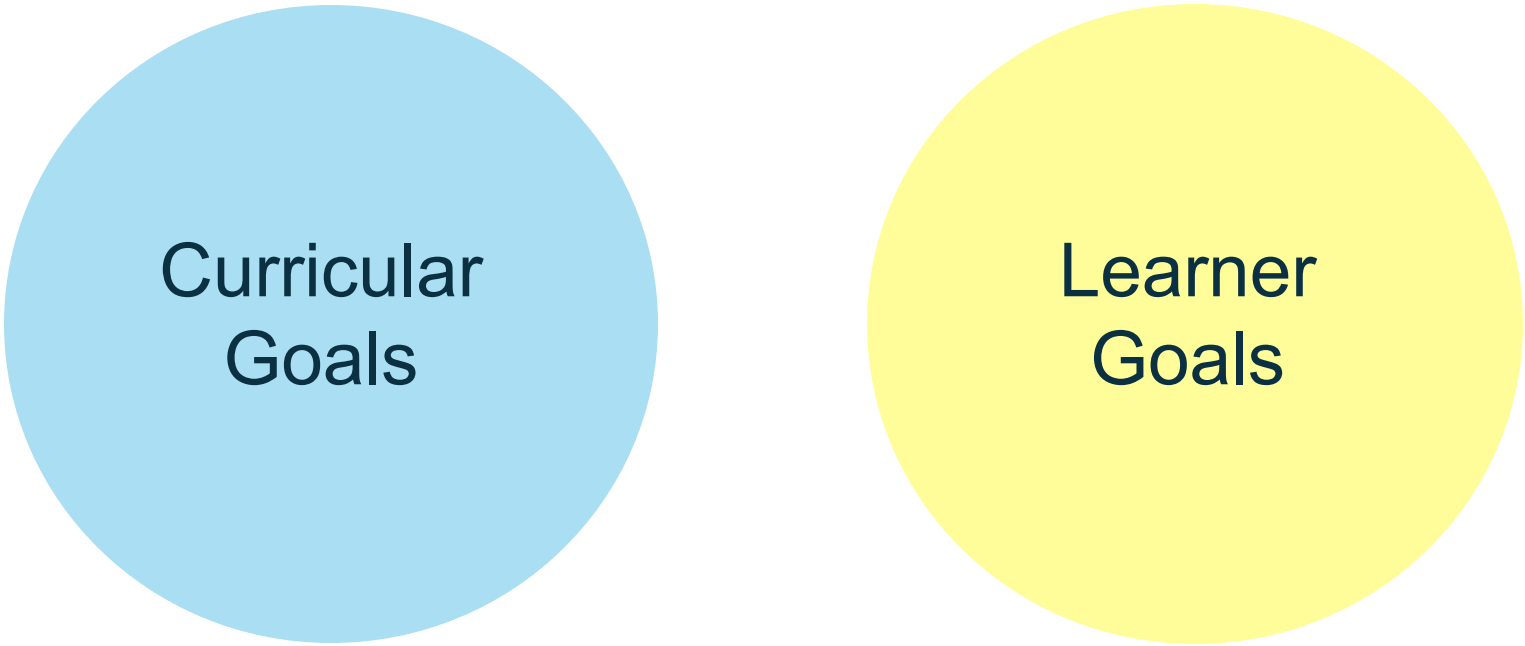
Acad Med 2012. 87: 1582-1593.

# Why do research during medical school?

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# Why do research during medical school?


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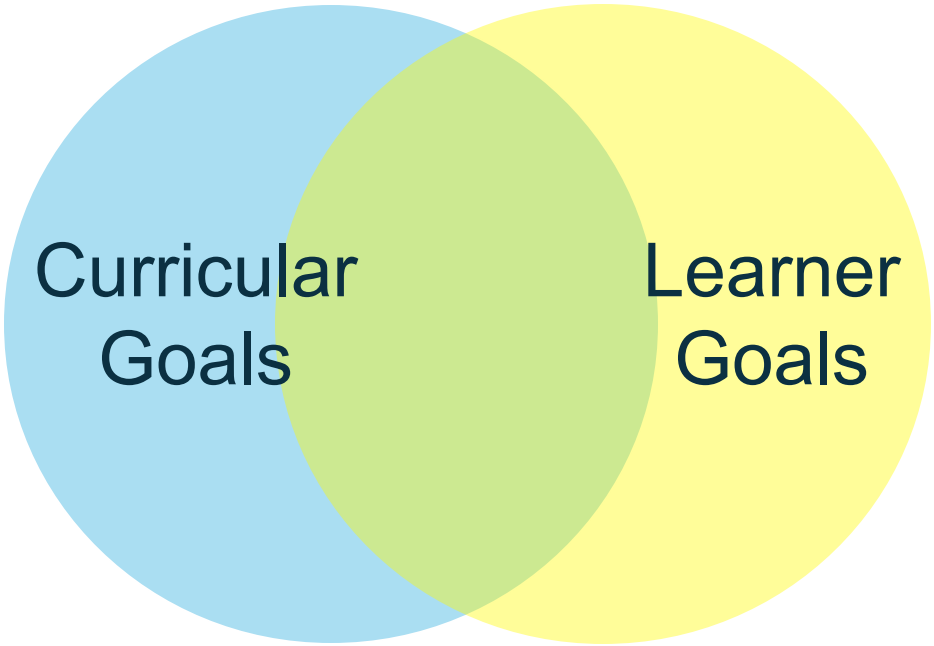
# Why do research during medical school?

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# What are OUR goals for our students?

- Become critical scientific thinkers
  - Generate hypotheses
  - Consider approach and methods
  - Evaluate results
  - Present work to peers
- Develop self-directed learning skills
- Develop and sustain interest in career-long research

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# What do our learners want?

**Goals of medical students participating in scholarly concentration programmes**

Kurt Alberson,[1] Vineet M Arora,[1,2] Karen Zier[3] & Rachel K Wolfson[1,4]


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*Medical Education* 2017; 51 (8): 852-860.

# Goals of first-year medical students

*Table 2 Survey goals by category*

| Goal | Mean | Standard deviation | Goal category |
|---|---|---|---|
| Gain proficiency in critical appraisal of the medical literature | 4.102 | 0.861 | Skills |
| Learn to write a manuscript | 3.882 | 0.957 | $\alpha = 0.73$ |
| Learn to create and present a poster | 3.676 | 0.966 | |
| Develop a research question and appropriate methods | 4.425 | 0.776 | |
| Complete statistical analysis | 3.903 | 0.965 | |
| Develop a career-long scholarly interest | 4.183 | 0.818 | |
| Develop expertise in certain topics | 4.022 | 0.825 | |
| Develop expertise in work related to a certain specialty | 3.774 | 0.914 | |
| Publish a manuscript | 4.097 | 0.871 | Accomplishments |
| First author on a manuscript | 3.710 | 1.014 | $\alpha = 0.79$ |
| Give a poster or talk at a regional or national meeting | 3.876 | 0.907 | |
| Enhance competitiveness for residency match | 4.419 | 0.760 | |
| Develop a strong mentoring relationship with a faculty member | 4.720 | 0.527 | |

Possible responses: 1 = not important at all; 2 = not important; 3 = neutral; 4 = important; 5 = very important.

n=186

Alberson et al. *Medical Education* 2017; 51 (8): 852-860.

# Skills vs Accomplishments

*Table 3 Regression results*

| Skill composite* | β coefficient | 95% CI | p-Value |
|---|---|---|---|
| Interest in research career | 1.87 | 1.03 to 2.71 | < 0.001 |
| Interest in competitive residency | −0.99 | −2.17 to 0.18 | 0.10 |
| Female gender | −0.39 | −1.58 to 0.80 | 0.52 |
| Site | −0.11 | −1.30 to 1.07 | 0.85 |
| **Accomplishment composite†** | **Odds ratio** | **95% CI** | **p-Value** |
| Interest in research career | 1.71 | 1.09 to 2.69 | 0.02 |
| Interest in competitive residency | 2.18 | 1.15 to 4.11 | 0.02 |
| Female gender | 0.76 | 0.40 to 1.44 | 0.40 |
| Site | 0.94 | 0.49 to 1.76 | 0.84 |

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Alberson et al. *Medical Education* 2017; 51 (8): 852-860.

# What are our students' concerns (and are they based in fact)?

- "Success" in research is important in highly competitive specialties
- Publication is critical in these specialties
- Scholarly work must take place in the specialty of interest
- Without a Step 1 score, above become more intensified

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**anecdotal, but consistent**

# How do residency Program Directors view scholarly work?

- What do PD say in surveys is important to them in selecting residents?
- What does the NRMP data show is actually happening?
- Is success in research an independent variable, or is it a proxy for other applicant characteristics?

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# How do residency Program Directors view scholarly work?

**Selection Criteria for Residency: Results of a National Program Directors Survey**

Marianne Green, MD, Paul Jones, MD, and John X. Thomas, Jr., PhD

- 2006. Survey study to >2500 program directors at university hospital or university-affiliated community hospitals
- 21 specialties
- 49% response rate

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Green et al. *Academic Medicine* 2009; 84: 362-367.

# How do residency Program Directors view scholarly work?

Table 2

**Rankings of the Importance of Academic Selection Criteria from a National Survey of Residency Program Directors, 2006**

| Academic criteria | Rank | Statistically different from rank(s)* |
|---|---|---|
| Grades in required clerkships | 1 | 2–14 |
| USMLE Step 1 score | 2 | 5–14 |
| Grades in senior electives in specialty | 3 | 6–14 |
| Number of honors grades | 4 | 6–14 |
| USMLE Step 2 score | 5 | 7–14 |
| USMLE Step 2 Clinical Skills pass | 6 | 8–14 |
| Class rank | 7 | 10–14 |
| Membership in Alpha Omega Alpha | 8 | 10–14 |
| Medical school reputation | 9 | 11–14 |
| Medical school academic awards | 10 | 12–14 |
| Grades in other senior electives | 11 | 14 |
| Grades in preclinical courses | 12 | 14 |
| Published medical school research | 13 | N/A |
| Research experience while in medical school | 14 | N/A |

* To illustrate statistical differences that exist when comparing all other selection criteria, this column indicates the ranks that are statistically different from the criteria listed in each row.

BUT…
When considering highly competitive specialties, research experience ranked more highly.

*"It may be that when all other selection criteria are outstanding among applicants to a particular specialty, research experience or research publications may help discriminate students."*

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Green et al. *Academic Medicine* 2009; 84: 362-367.

# Specialty-Specific Studies:

- Anesthesiology
  - Only 17% ranked Research as a top-10 consideration
  - 91% listed USMLE Step 1 score
- Otolaryngology (review)
  - More publications from recent applicants
  - More publications not correlated w resident performance
- Urology
  - Research ranked 6th in importance by PDs
  - More publications from recent applicants
  - Publications may be more important for programs in academic centers

Vinagre et al. Cureus 2020. 12(11):e11550.
Bowe et al. Otolaryngol Head Neck Surg 2017. 156: 985-990.
Calhoun et al. Otolarnygol Head Neck Surg 1997; 116:647-651.
Weissbart et al. Urology 2015. 85: 731-736.
Huang and Clifton. Current Urol Reports 2020. 21:37.

# Data from the NRMP

## 2021 Program Directors Survey

**August 2021**

**https://www.nrmp.org/wp-content/uploads/2021/11/2021-PD-Survey-Report-for-WWW.pdf**

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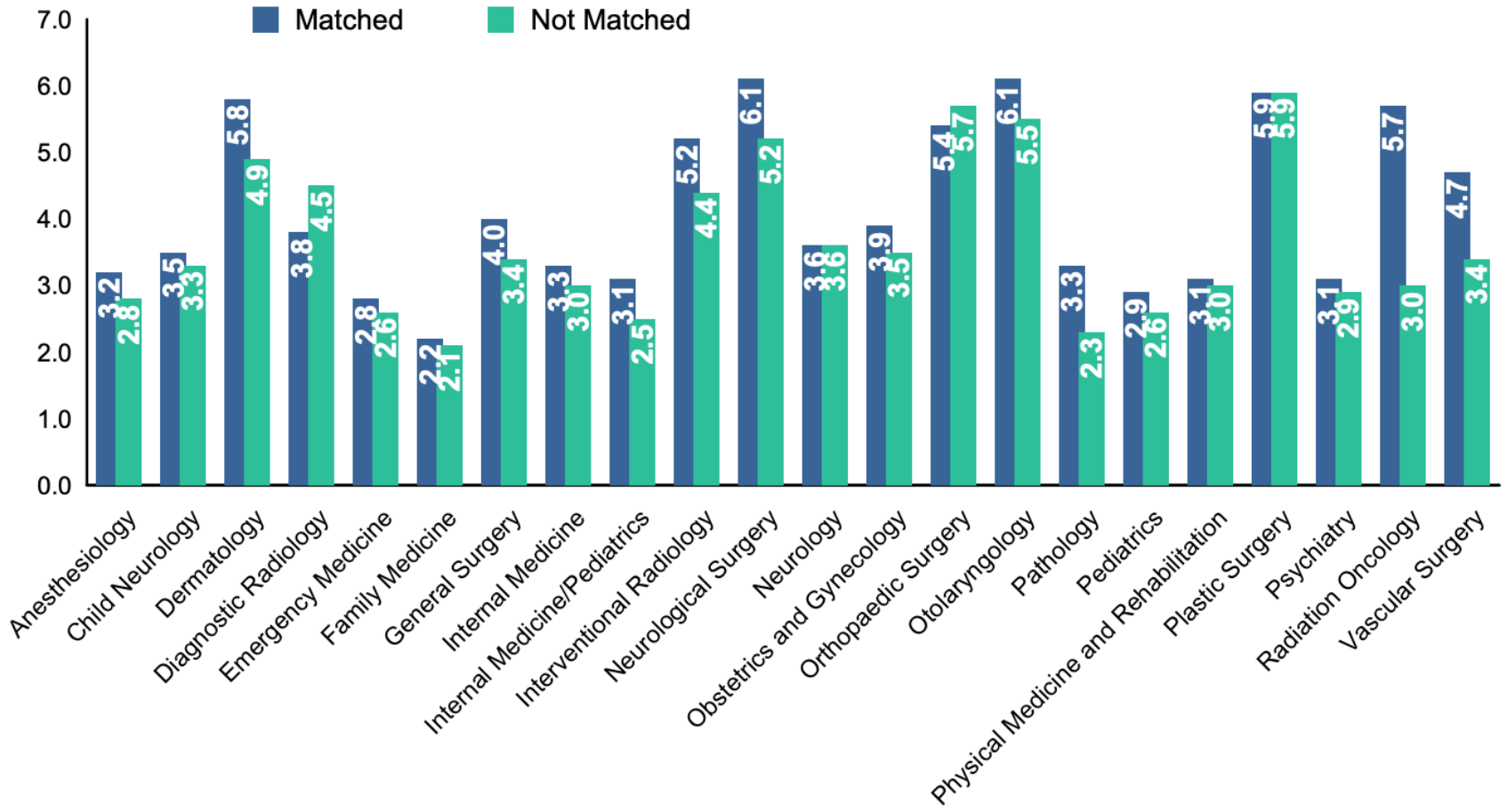
**Chart 8**

## Mean Number of Research Experiences of U.S. MD Seniors

***by Preferred Specialty and Match Status***




*Source: NRMP Data Warehouse*

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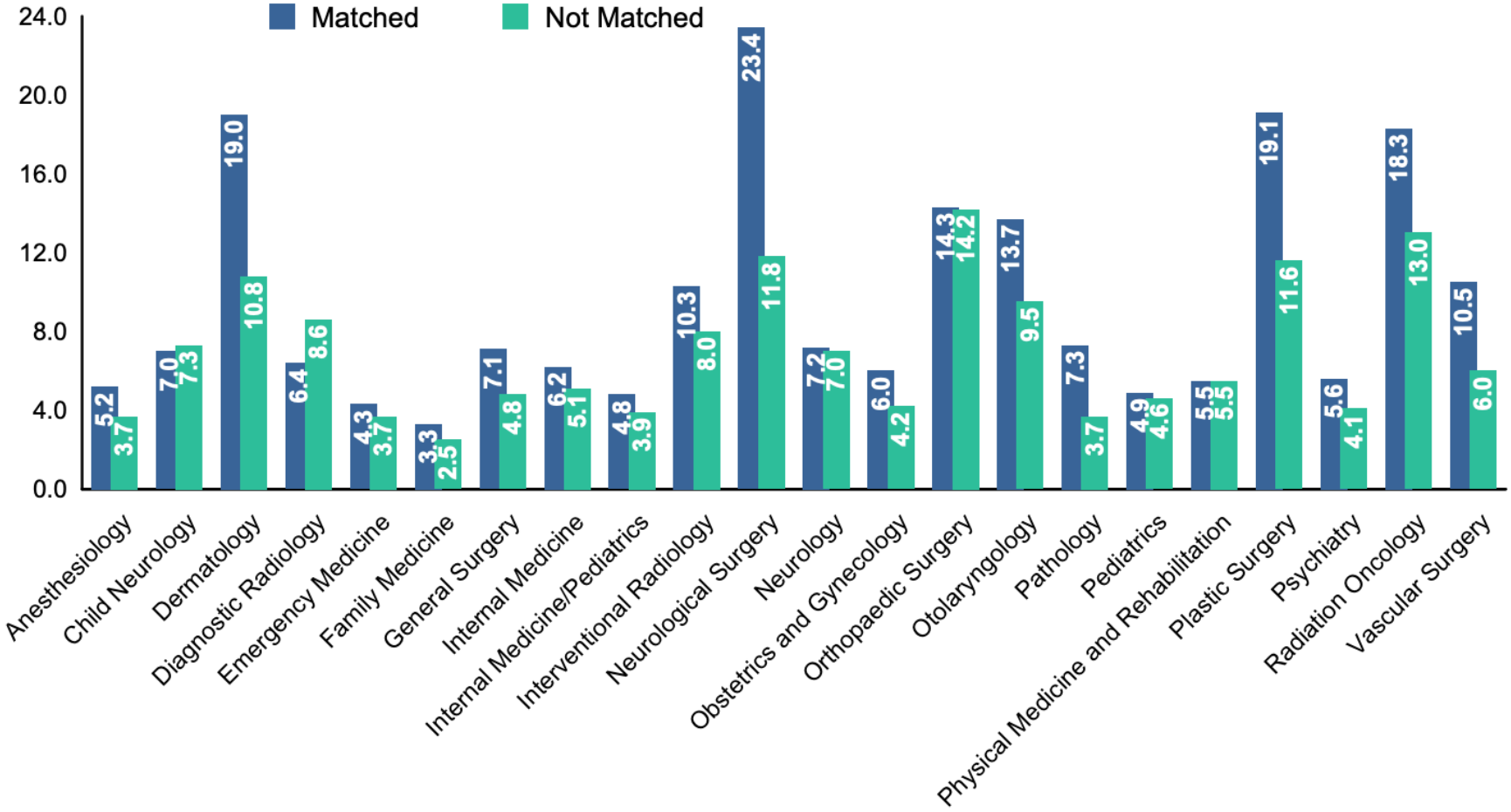
https://www.nrmp.org/wp-content/uploads/2021/08/Charting-Outcomes-in-the-Match-2020_MD-Senior_final.pdf

**Chart 9**

## Mean Number of Abstracts, Presentations, and Publications of U.S. MD Seniors

***by Preferred Specialty and Match Status***




*Source: NRMP Data Warehouse*

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https://www.nrmp.org/wp-content/uploads/2021/08/Charting-Outcomes-in-the-Match-2020_MD-Senior_final.pdf

# 2021 NRMP Program Director Survey
August 2021

Education and Academic Performance Characteristics

Personal Characteristics and Other Knowledge of Applicants

- Involvement and interest in research
- Interest in academic career

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THE MATCH® NATIONAL RESIDENT MATCHING PROGRAM®

https://www.nrmp.org/wp-content/uploads/2021/11/2021-PD-Survey-Report-for-WWW.pdf

**Figure PD_I3**

## Personal Characteristics and Other Knowledge of Applicants Considered in Deciding Whom to Interview (%)

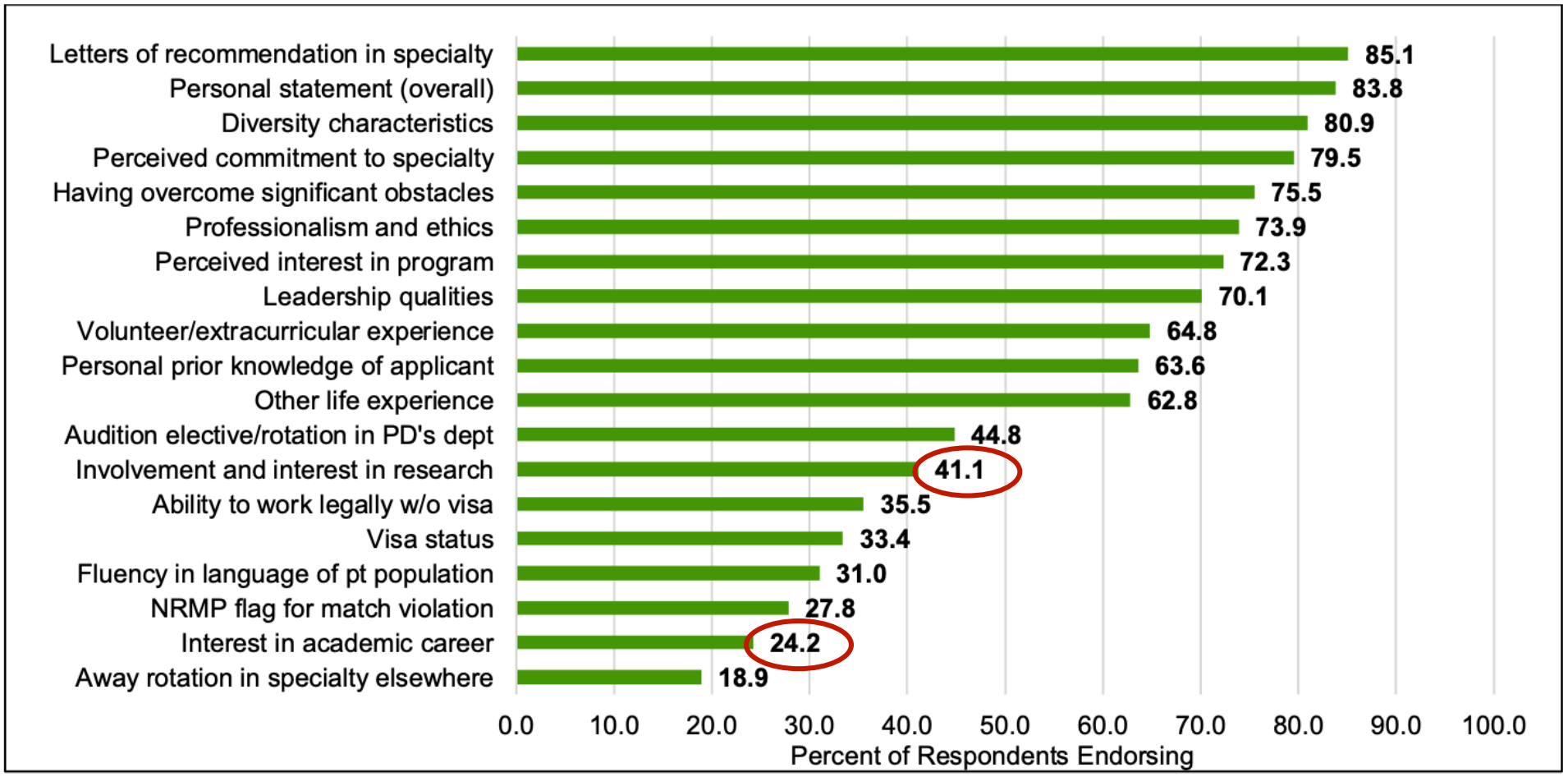


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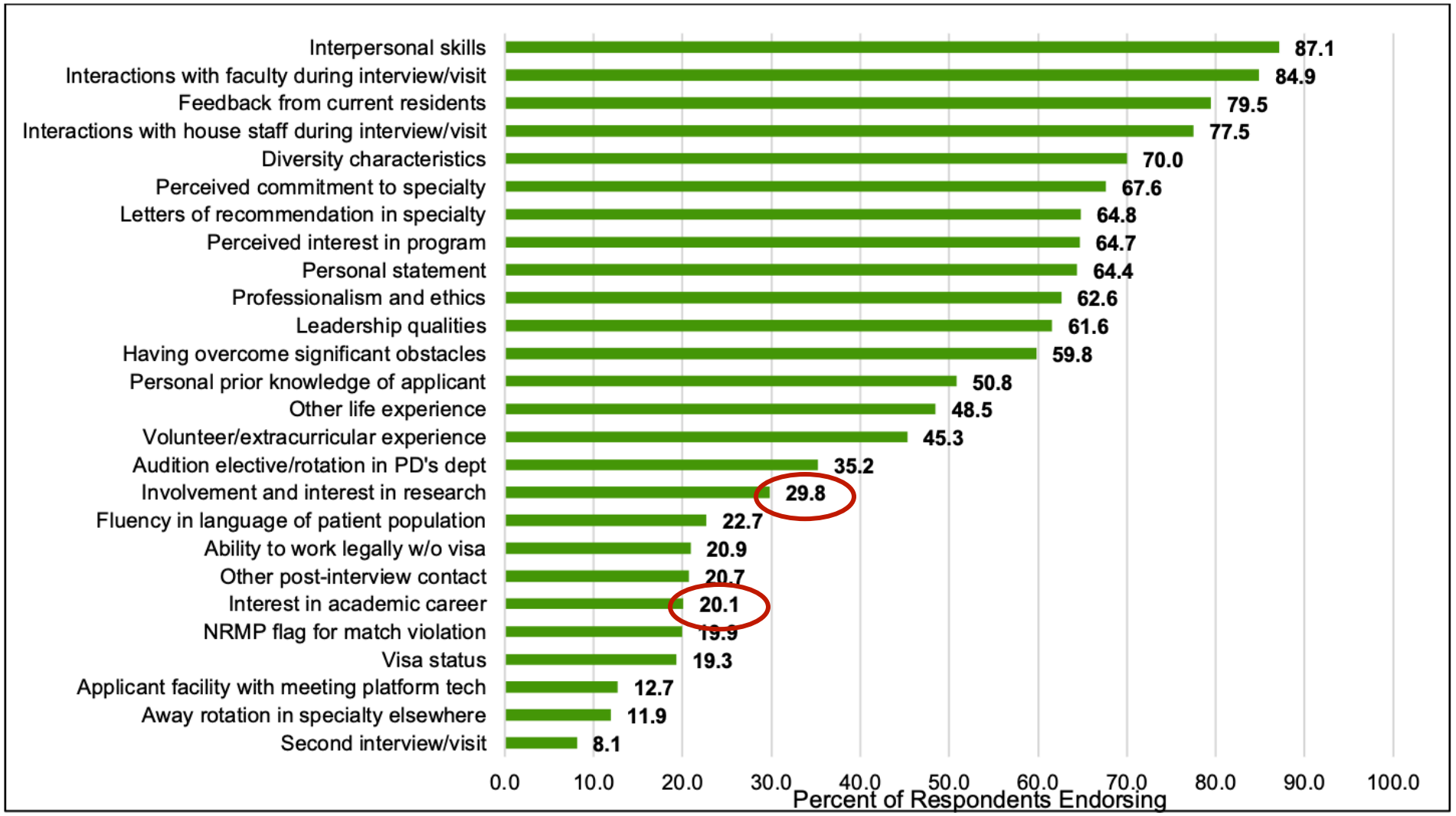
**Figure PD_R3**

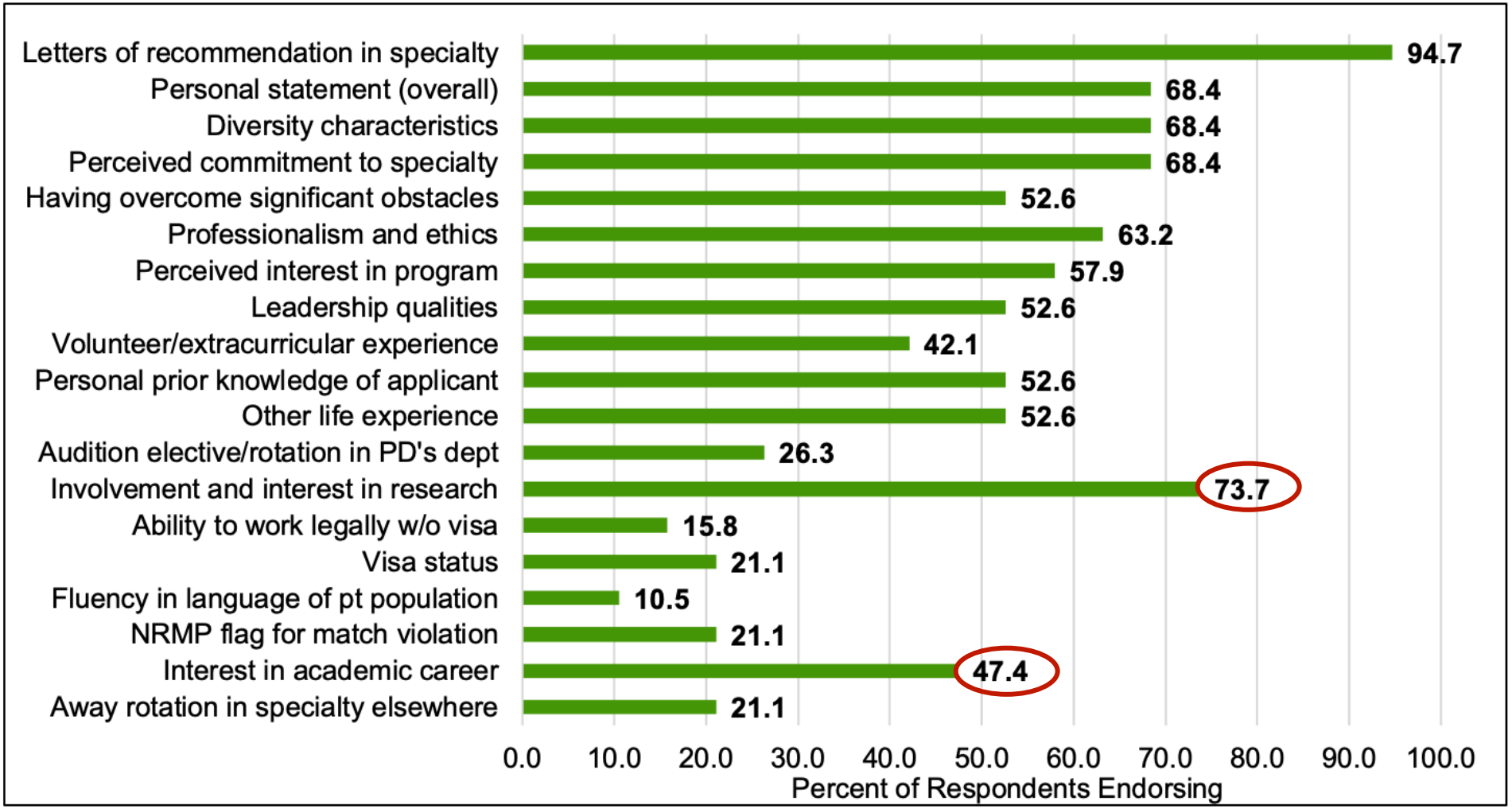
## Personal Characteristics and Other Knowledge of Applicants Considered in Deciding Whom to Rank (%)



# Neurosurgery

**Figure PD_NS-I3**

**Personal Characteristics and Other Knowledge of Applicants Considered in Deciding Whom to Interview (%)**



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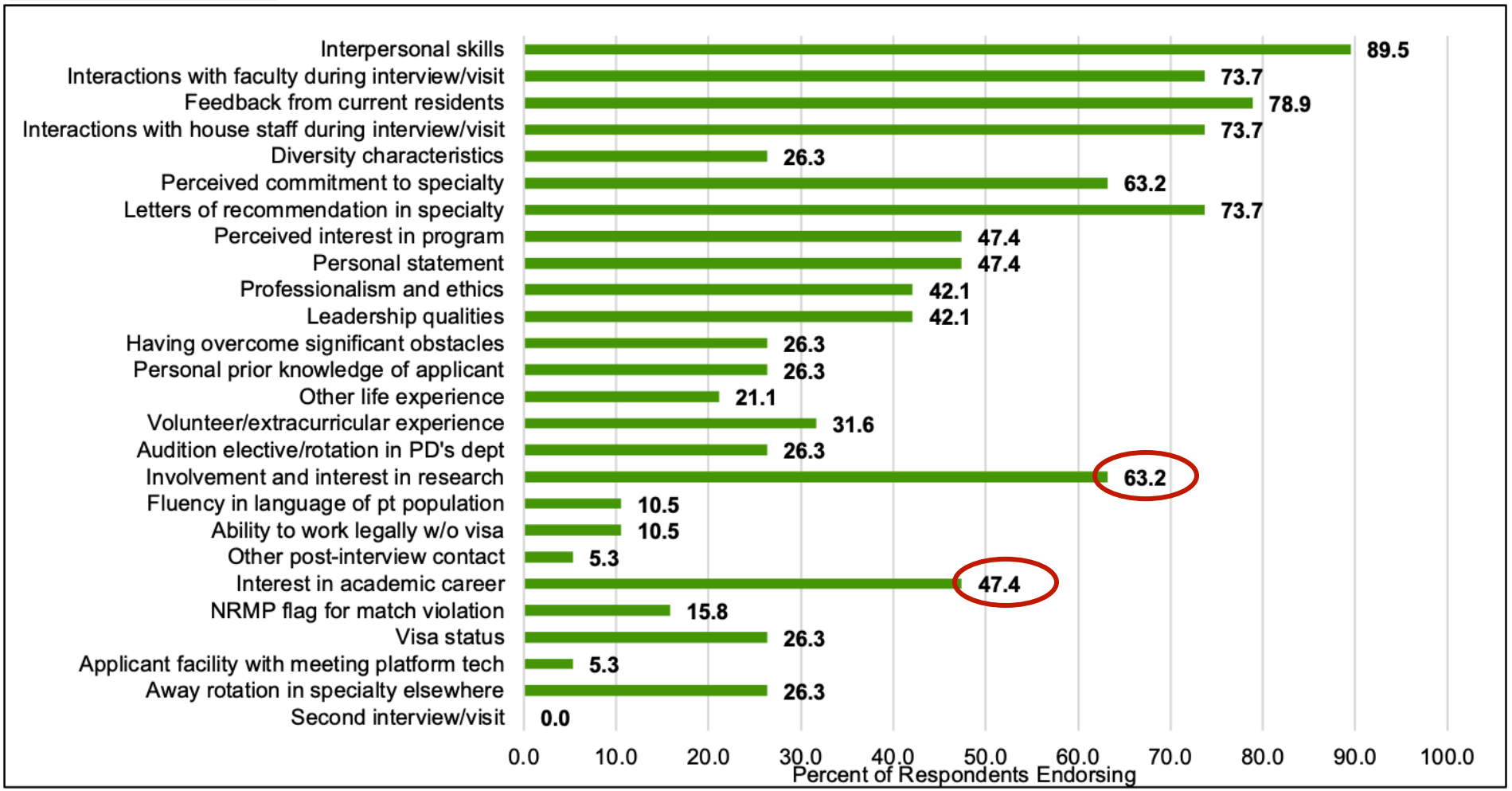
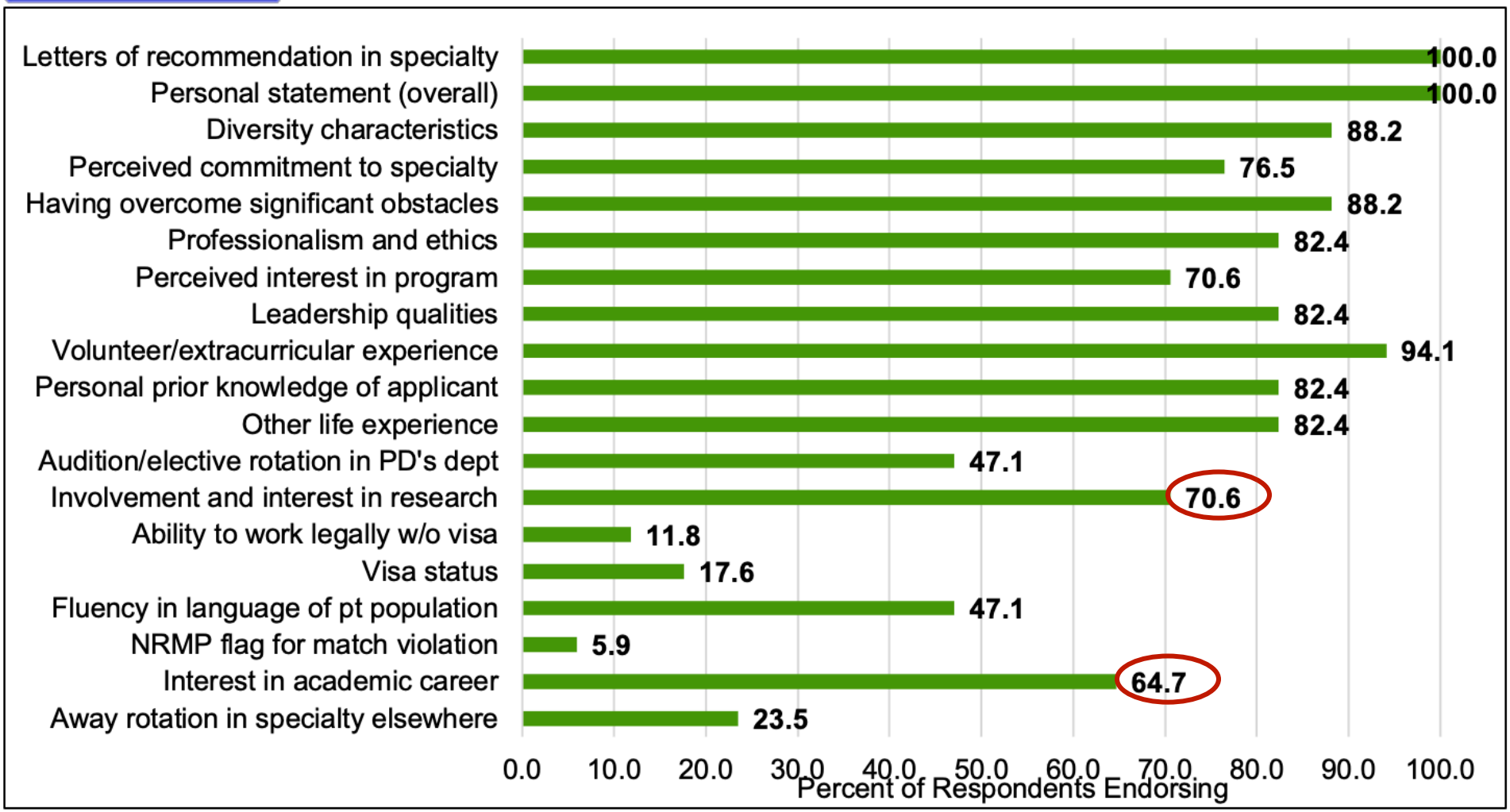


# Dermatology

**Figure PD_D-I3**

**Personal Characteristics and Other Knowledge of Applicants Considered in Deciding Whom to Interview (%)**



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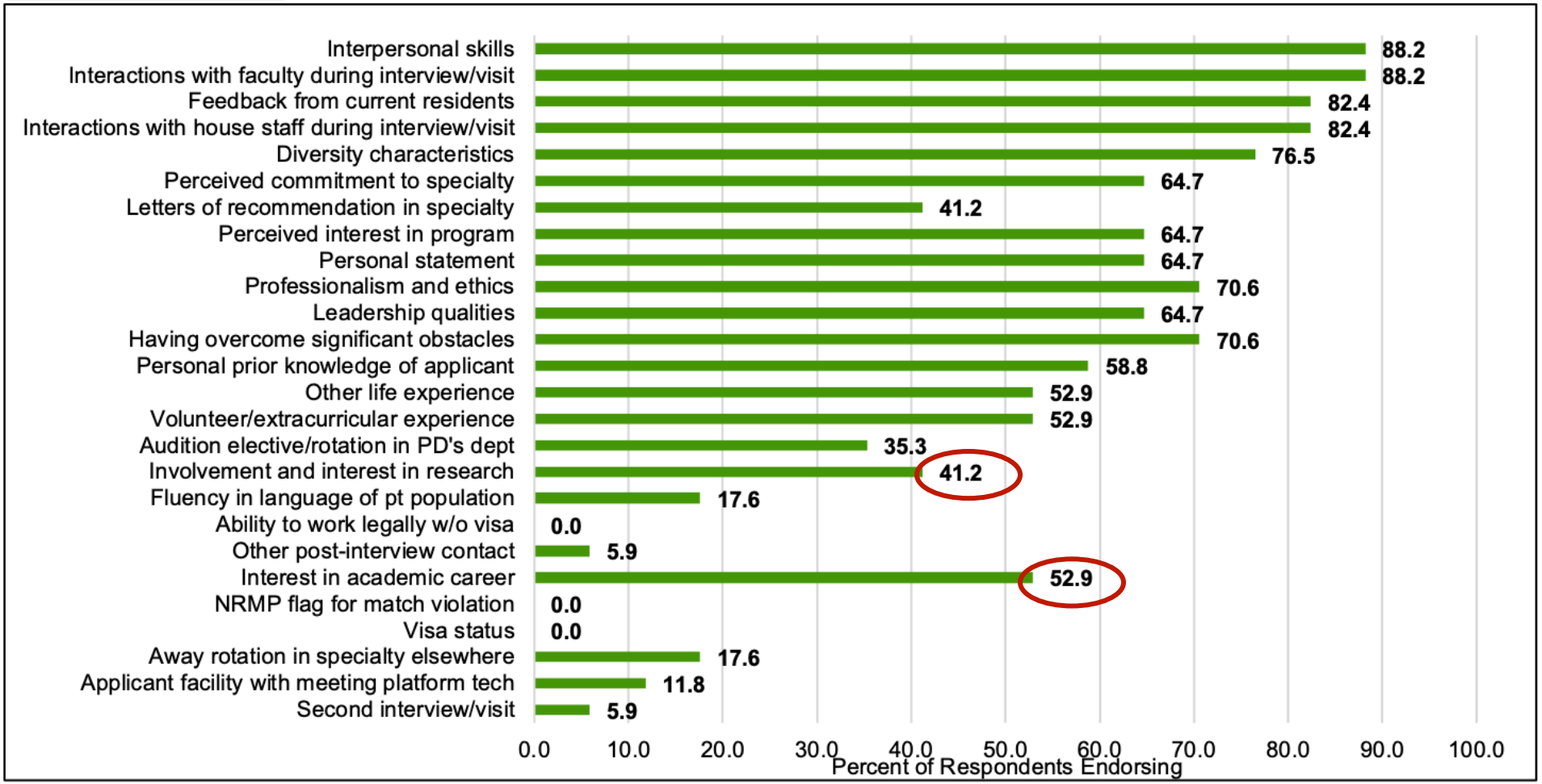

# Pediatrics

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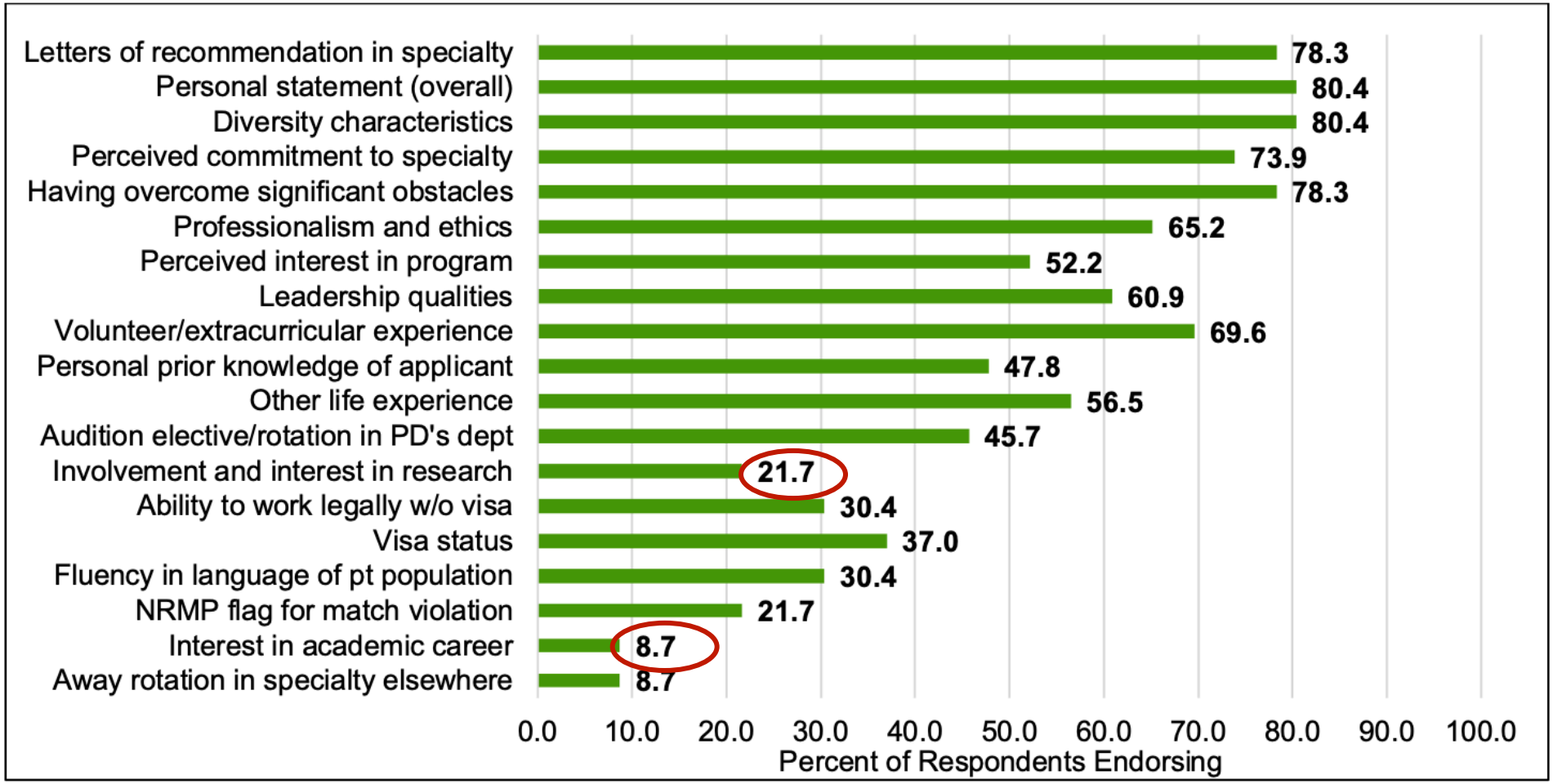

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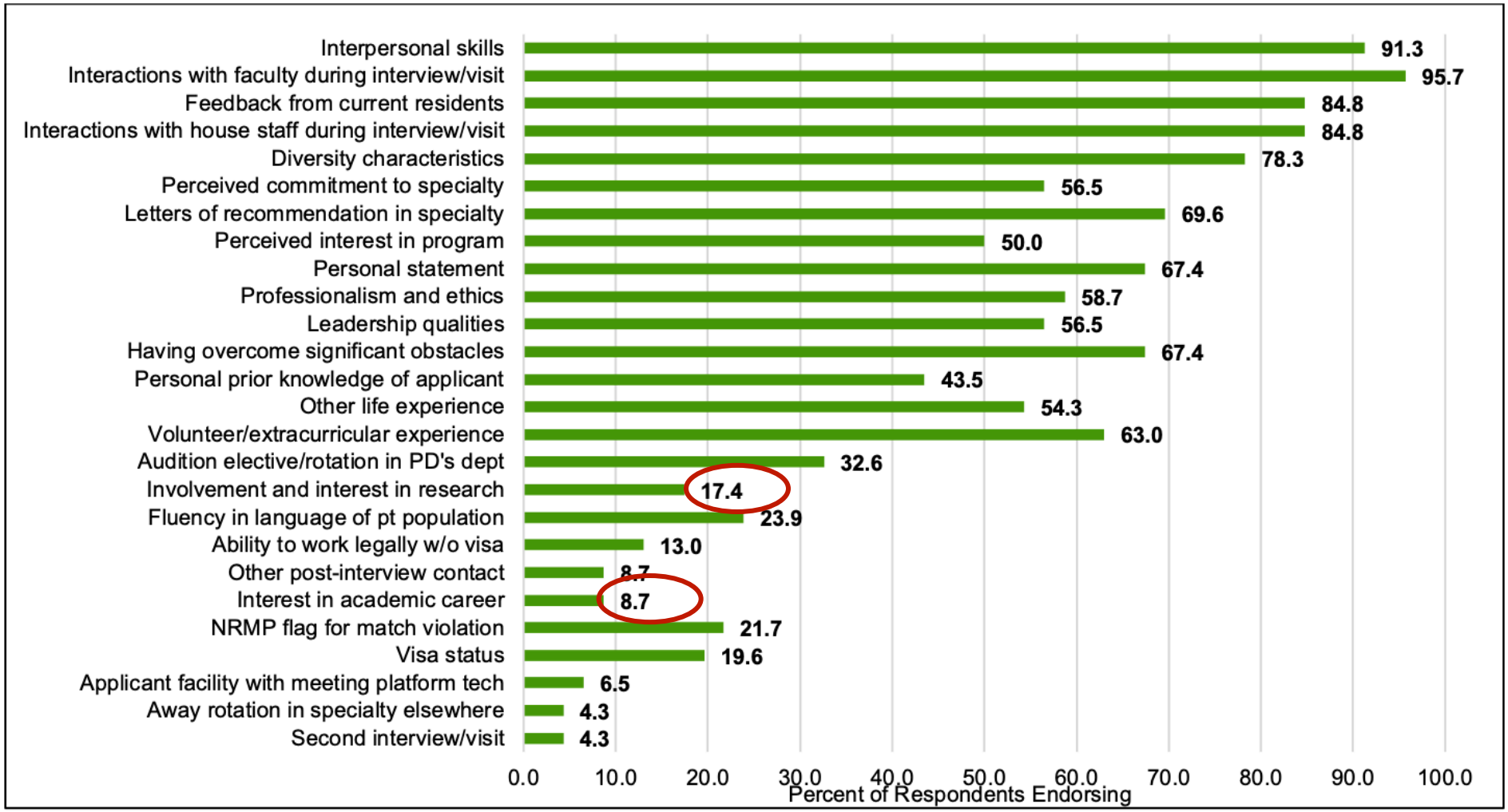

# Students applying to highly competitive specialties are on to something….and that's *before* Step 1 becomes Pass/ Fail

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# Current use of USMLE Step 1

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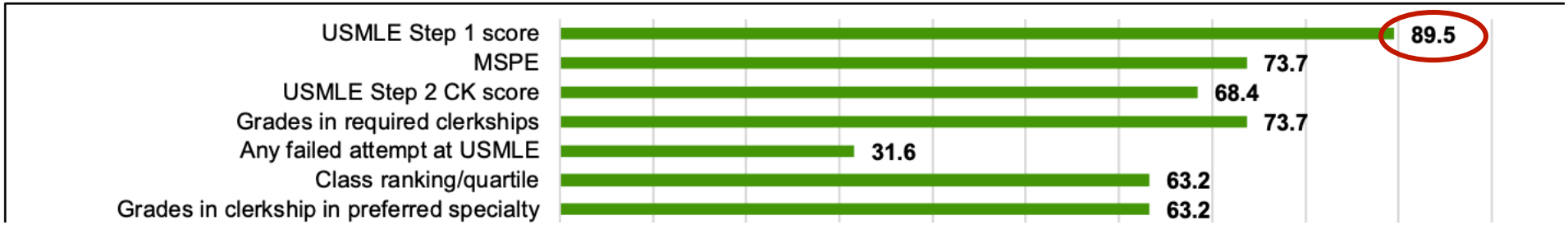
# Neurosurgery

**Figure PD_NS-I1** **Education and Academic Performance Characteristics Considered in Deciding Whom to Interview (%)**

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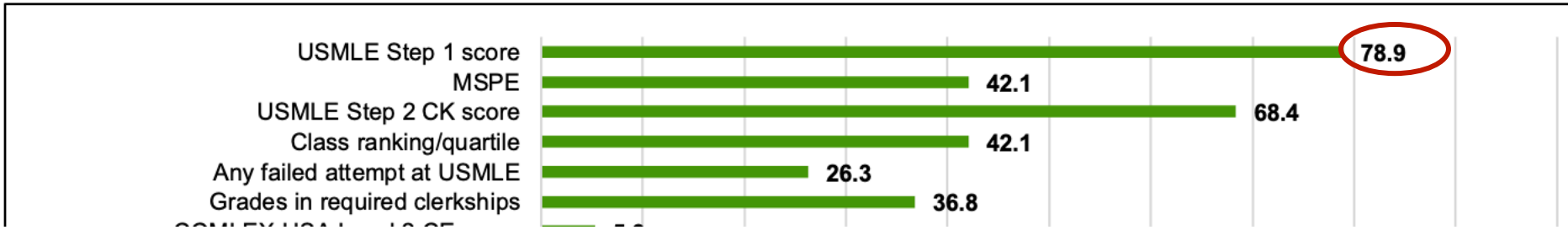


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# Dermatology

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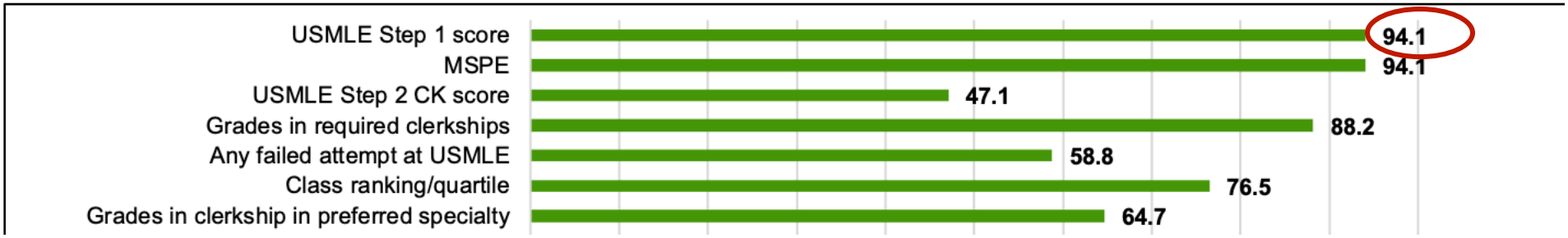


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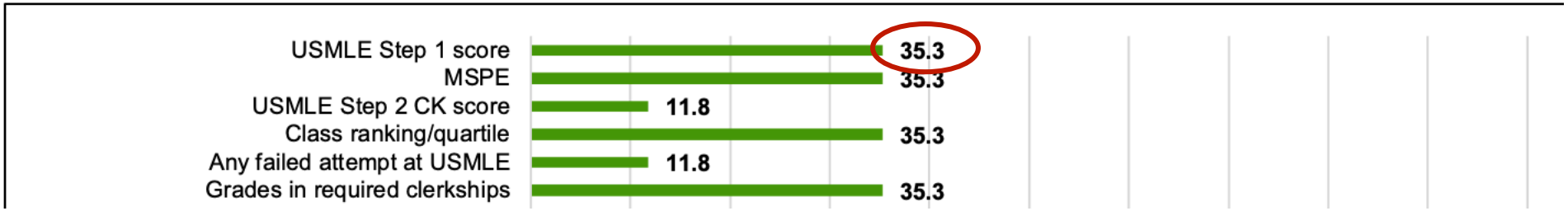


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# Pediatrics

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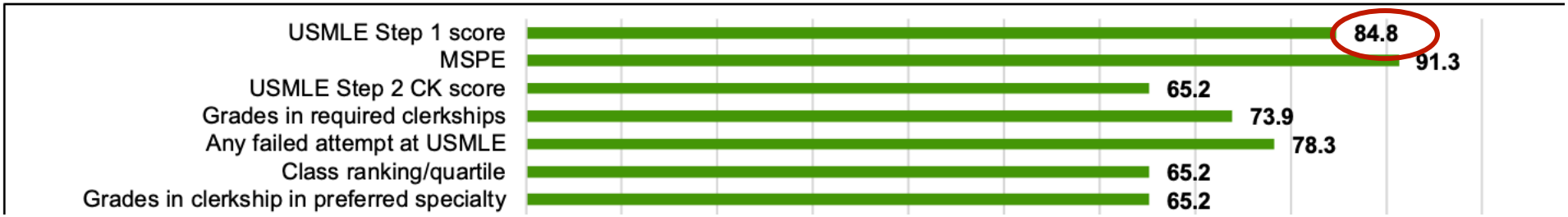


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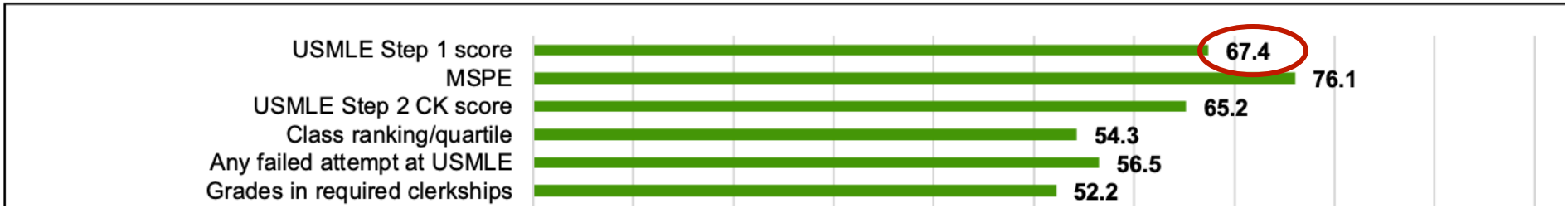


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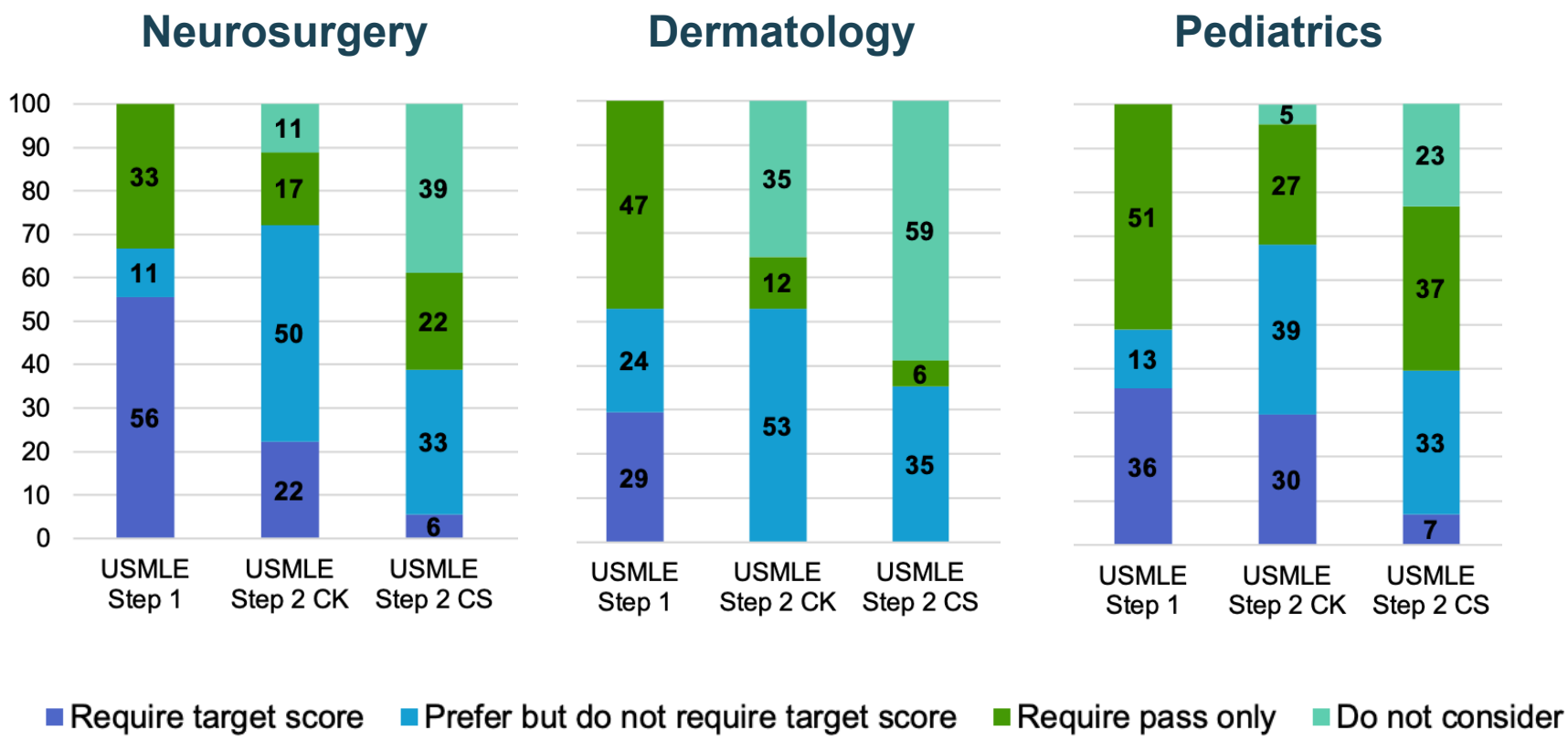
# Current use of USMLE Step 1

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# Where do we go from here?
# How do we advise our students?

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# Questions

- Will the weight given to USMLE Step 1 simply be transferred to Step 2?
- Will participation in research become even more important in highly competitive specialties?
- Will participation in research gain new importance in other specialties?

**WHY???**

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**What is research/productivity a proxy for in the resident selection process?**

# Applicant attributes:

- Communication skills
- Teamwork skills
- Time management skills
- Intellectual curiosity
- Critical thinking skills
- Self-directed learning skills
- Perseverance

- Commitment to specialty
- Likelihood of research success in residency
- Likelihood of academic career
- Likelihood of research in career after training

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**Will this be different without Step 1?**

# Program Director Survey

- Developed by sub-group of the Scholarly Concentrations Collaborative
- In the field August-Nov 2021
- Sent to 5000 program directors

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# Goals of the survey

- Describe what PD define as “meaningful participation in research”
  - Importance of TYPE of research (and if productivity goalposts are different for different types of research)
  - Importance of SPECIALTY of research
- Describe applicant traits for which research participation is a proxy
- Learn how research may be viewed differently as Step 1 moves to pass/fail

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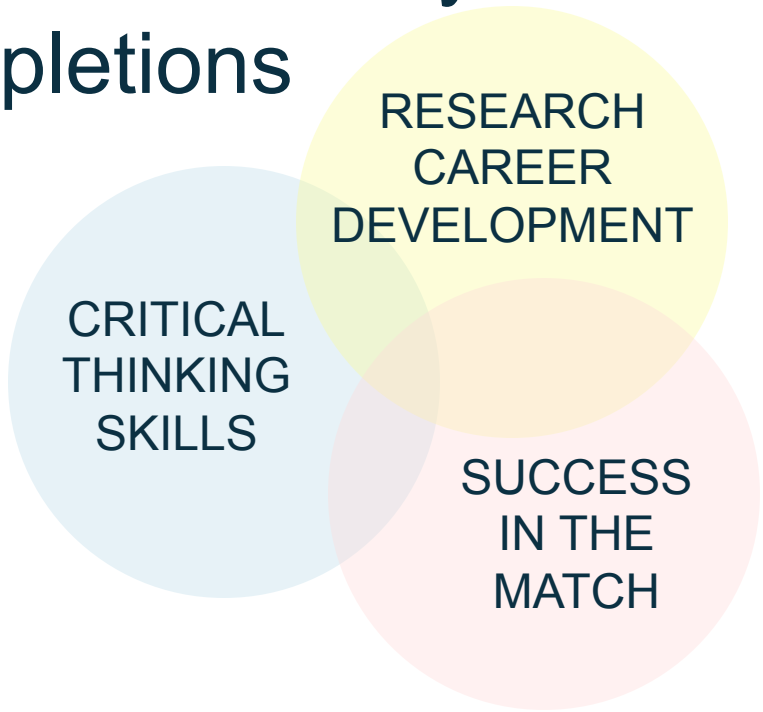
# Closing thoughts…

- SCPs present a remarkable opportunity for:
  - Mentorship
  - Role modeling
- Research teaches many skills beyond project completions
- Balance

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