Biomedical Graduate Admissions

Who should we admit?

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**Applications**
- single application;
- 4 admissions committees

**Interviews**
- Campus visit; 5 one-on-one faculty interviews

**First Year Training**
- unified first year cohort; 6 small groups

**2nd year and beyond**
- Students transfer out of BBSP and into one of 14 different member PhD programs
UNC Office of Graduate Education
Part 1: UNC BBSP admissions study

Part 2: Using data to guide admissions
Part 1: UNC BBSP admissions study

Part 2: Using data to guide admissions
Predictors of Student Productivity in Biomedical Graduate School Applications

Joshua D. Hall, Anna B. O’Connell, Jeanette G. Cook

Published: January 11, 2017 • http://dx.doi.org/10.1371/journal.pone.0169121
Motivations for this study

1. Experiences of our PREP scholars
UNC PREP

Josh Hall, PhD
Motivations for this study

1. Experiences of our PREP scholars
2. 2014 UCSF study
How should we be selecting our graduate students?

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UCSF found that years of research experience and subject GRE scores differed between high and low performing graduate students (not general GREs, GPA, undergrad institution ranking).

Outcome measures were subjective (faculty opinions) and coarse (only two bins), and the sample sizes were relatively small (31 “top performing” and 21 “bottom performing” students).

“I would urge faculty elsewhere to conduct similar analyses to improve the admissions process and to minimize the use of useless metrics in selecting our students.”
Our Goal

To objectively study application metrics as they relate to student outcomes
Our question

Do application metrics differ between highly productive and less productive biomedical PhD students at UNC Chapel Hill?
STUDY DESIGN

Study cohort:
UNC BBSP PhD students who matriculated in 2008, 2009, and 2010 (n=280)

Application data:
• GRE V, Q, W,(percentile)
• Undergraduate GPA
• Months of prior research experience
• Recommendation letter rankings
• UNC faculty interview scores

Outcomes:
• Number of first-author publications
  • Highly productive (3+)
  • Productive (1-2)
  • Lowly productive (0 1st; ≥ 1 mid-author)
  • Lowest productive (0)
• Degree outcome / Time-to-degree
**Student Publications**

**CONSIDERATIONS**

- All first-author papers were considered equal
- Review articles count the same as primary research
- No attempt to assess “quality” or impact
- All non-first author positions were considered equal

**Custom Python Script** → **PubMed query** → **XML output**

**Author Search:**
Student last name + Advisor last name

**For each pair**
- # 1st author publications
- total # publications
General GRE scores do NOT predict student productivity

Kruskal-Wallis

Quantitative

Verbal

Writing

Kruskal-Wallis

Hall et. al. 2017, PLoS One
Vanderbilt GRE Study
634 IGP students, 2003–2011

NOT PREDICTIVE

- PhD completion
- Time to degree
- Passing qualifying exam
- # of conference presentations
- # of publications
- Obtain fellowship/grant

MODERATELY PREDICTIVE

- Grades in first year courses

GRE scores DO vary by demographic groups at UNC.
Other metrics that do NOT predict productivity

- Undergraduate GPA
- Number of months previous research experience

Hall et al. 2017, PLoS One
Prior research experience does NOT predict student productivity

Hall et. al. 2017, PLoS One
Other metrics that do NOT predict productivity

- Undergraduate GPA
- Number of months of previous research experience
- Faculty interview scores

Hall et. al. 2017, PLoS One
Interview ratings do NOT predict student productivity

Overall interview rating

1 = Admit and Recruit
2 = Admit
3 = If there’s space
4 = Reject

Hall et al. 2017, PLoS One
Does anything in the graduate application differ between student productivity groups?
Letters of Recommendation

**Recommender Rating Scale**

- "Exceptional" = 1
- "Outstanding" = 2
- "Very Good" = 3
- "Above Average" = 4
- "Below Average" = 5
Recommender ratings DO predict student productivity

Recommender Ratings

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“Outstanding” = 2
“Very Good” = 3
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* p<.05, ** p<.01, Dunn’s Multiple Comparisons Test

Hall et al. 2017, PLoS One
Limitations and future directions

Limitations:

• Only enrolled students
• Bias in letters and interviews
• No students without research experience
• All publications considered equal, no credit for co-first authorship
• Didn’t account for other factors that may impact productivity

Future Directions:

• Effects of training environment / advisor on productivity
• Qualitative assessment of highly productive vs lowly productive graduate students (non-cognitive / psychosocial factors)
Recommendations

1. De-emphasize the GRE in admissions decisions (or eliminate it)

2. Continue to prioritize research experience - higher focus on applicant potential described in letters, and less on institutional quality or amount of research

3. Define admissions criteria in advance

4. Consider ways to assess non-cognitive qualifications (motivation, perseverance, self-awareness, adaptability, optimism, etc.)

5. Work towards holistic review
Part 1: UNC BBSP admissions study

Part 2: Using data to guide admissions
1. Admissions committee education
   a. Implicit bias
   b. Results of admissions study and other GRE studies

2. New application review criteria
   a. research experience (includes quality, time, letters, description in statement)
   b. academic preparation (test scores, GPA, writing evidence in statement)
   c. motivation/potential (letters, statement, papers)
   d. overall enthusiasm

3. Online application workflow
   a. Default information displayed does not include test scores or GPA
UR admissions prior to changes

- Interviewed
- Admitted

% UR students of BBSP total

UR admissions after 2015 changes were implemented
Number of UR students interviewed has increased.
Challenges

Application review:
- How to evaluate academic preparation
- Consistent use of review criteria
- Workload
- Educating interviewers (300+ at UNC)

Culture change:
- Role of committee chair
- The power of anecdotal evidence
- Looking for well suited vs perfect candidates
Part 1: UNC BBSP admissions study

Part 2: Using data to guide admissions
“Diversity doesn’t stick without inclusion”
UNC attrition, retention, and graduation data

Current UNC BBSP retention/graduation rate

- 85% for UR students
- 88% for all students

(Feb 2017)
Acknowledgements

Josh Hall, PhD  Director of UNC PREP (co-author)
Jean Cook, PhD  Associate Dean Graduate Education
Ashalla Freeman, PhD  Director of Diversity Affairs

Office of Graduate Education (others)

• Faculty Director of BBSP  Rob Nicholas, PhD

• Program Directors: Beka Layton, PhD; Patrick Brandt, PhD; Jessica Harrell, PhD

• Admissions/Student Services: Sue Modlin, Jeff Steinbach

• Business and Administrative Support: Sausyty Hermreck, Dani Burkhart, Danesha Curry