



Smith Student Outcomes and Baccalaureate Origins





Overview of Outcomes Research

- Need for outcomes data and analysis
 - Grant applications
 - Program design
 - Program assessment
 - Continuous improvement
- What do we know?
 - National context
 - Baccalaureate origins of PhDs data set
 - Smith's alumnae survey
 - SURF research
- Discussion: What do we want to know?





What do we Know?

- Sources for National Context
 - National Science Board. 2010. Science and Engineering Indicators 2010. Arlington, VA: National Science Foundation (NSB 10-01).
<http://www.nsf.gov/statistics/seind10/start.htm>
 - AAUW. 2010. Why so few? Women in science, technology, engineering, and mathematics. Washington: hill, c., corbett, c., st. rose, a.
<http://www.aauw.org/research/upload/whysofew.pdf>
 - National Science Foundation, Division of Science Resources Studies. 2006. Baccalaureate Origins of S&E Doctorate Recipients (NSF 08-311).
<http://www.nsf.gov/statistics/infbrief/nsf08311/>





NSB: Science and Engineering Indicators 2010

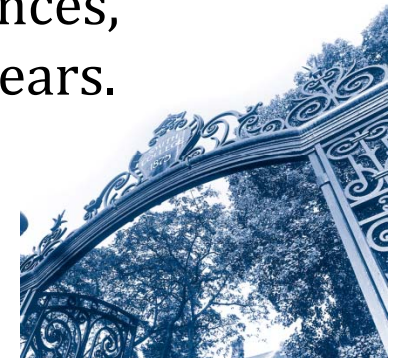
- The number of S&E (includes social and behavioral sciences) bachelor's degrees has risen steadily over the past 15 years. S&E bachelor's degrees have consistently accounted for 1/3 of all bachelor's degrees in the past 15 years.
- The share of Bachelor's degrees awarded to women increased in many major S&E fields from 1993-2007.
- Women have earned 58% of all bachelors degrees since 2002, and have earned about half of all S&E bachelor's degrees since 2000, but major variations exist.





NSB: Science and Engineering Indicators 2010

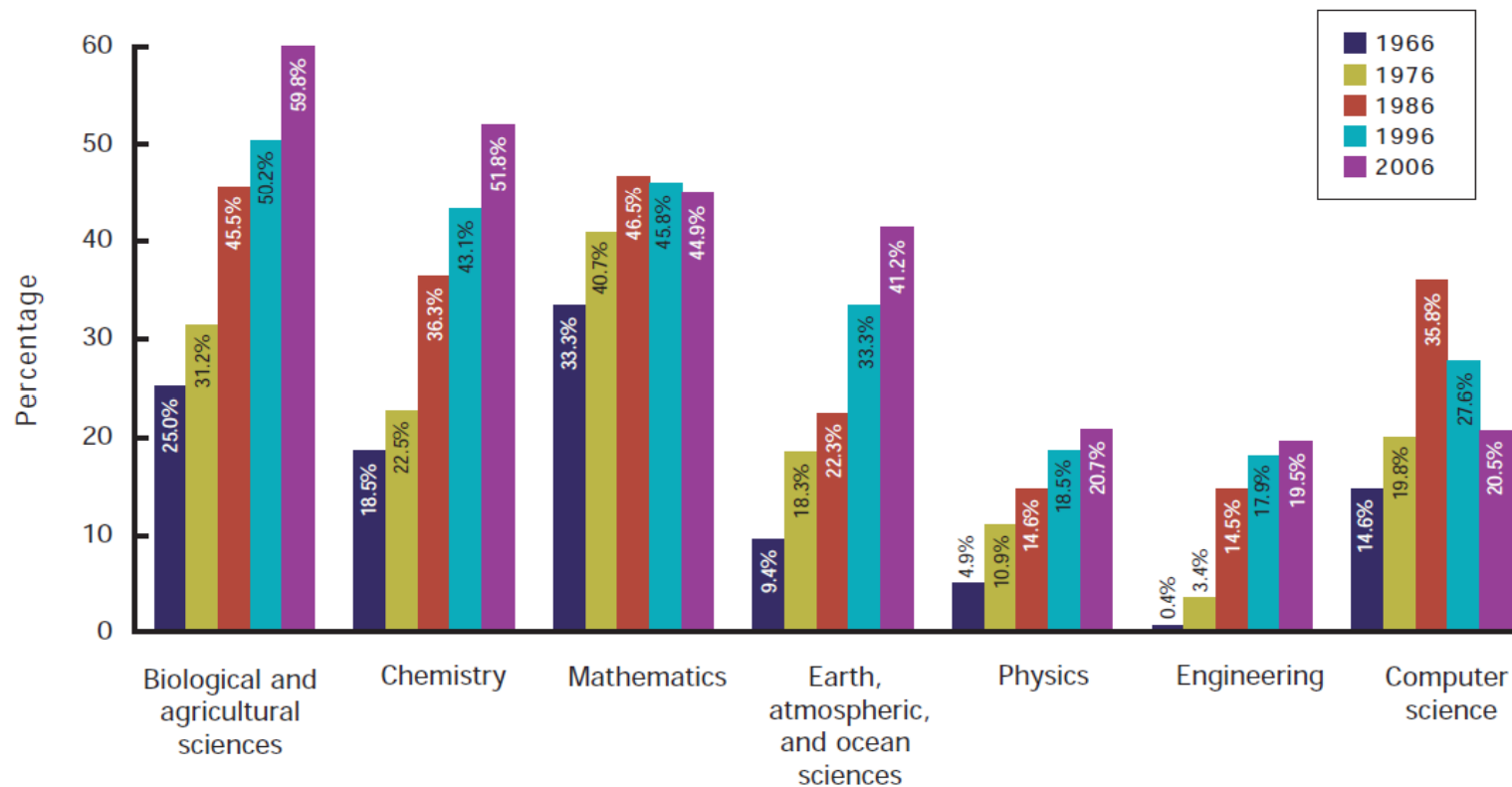
- In 2007, men earned a majority of bachelor's degrees awarded in engineering, computer sciences, and physics (81%, 81%, and 79%, respectively).
- Women earned half or more of bachelor's degrees in psychology (77%), biological sciences (60%), social sciences (54%), agricultural sciences (50%), and chemistry (50%) (A recent increase from 41% since 1996).
- Women's share of bachelor's degrees in computer sciences, mathematics, and engineering has declined in recent years.





AAUW: Why So Few? 2010

Figure 6. Bachelor's Degrees Earned by Women in Selected Fields, 1966–2006



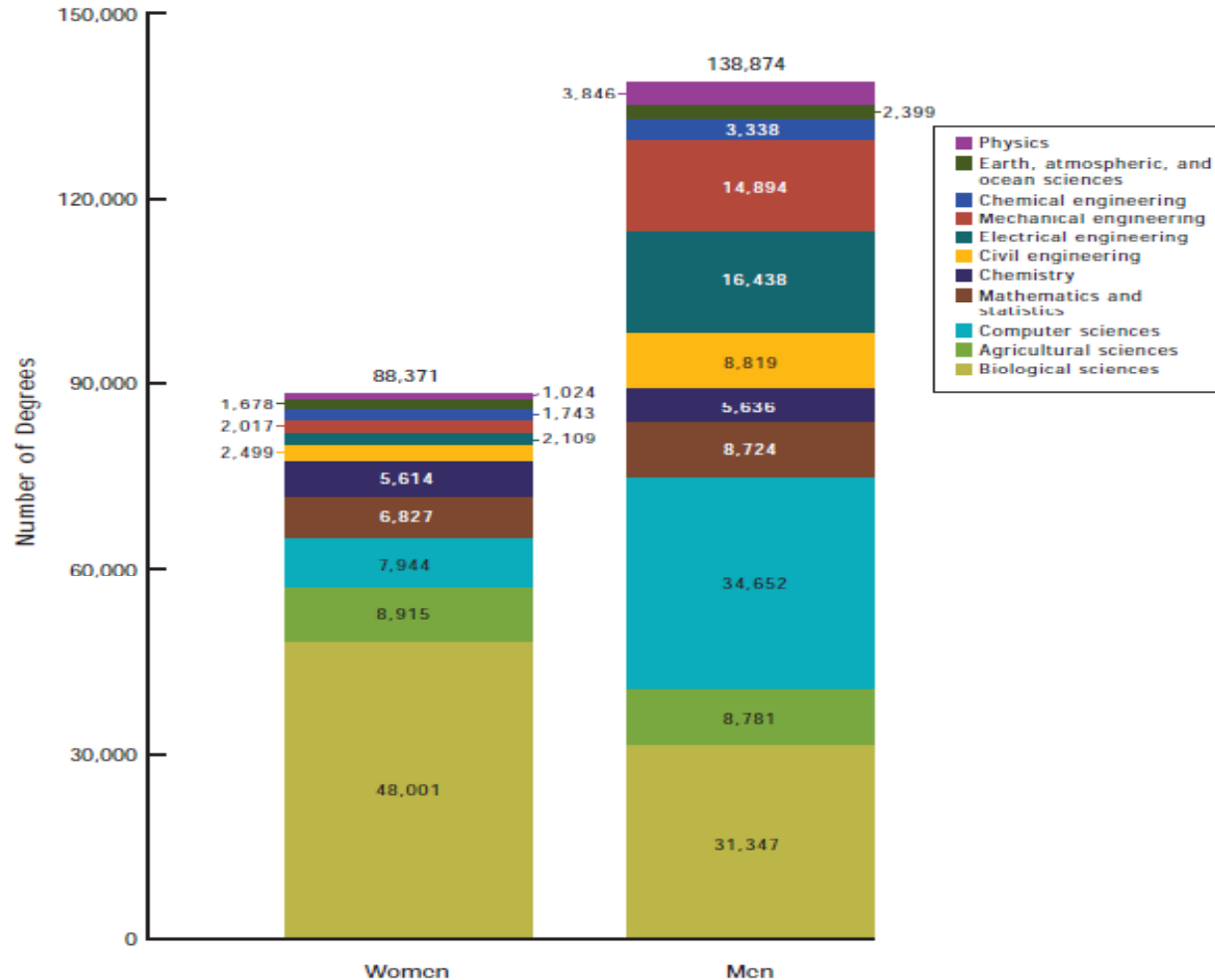
Source: National Science Foundation, Division of Science Resources Statistics, 2008, *Science and engineering degrees: 1966–2006* (Detailed Statistical Tables) (NSF 08-321) (Arlington, VA), Table 11, Author's analysis of Tables 34, 35, 38, & 39.





AAUW: Why So Few? 2010

Figure 7. Bachelor's Degrees Earned in Selected Science and Engineering Fields, by Gender, 2007

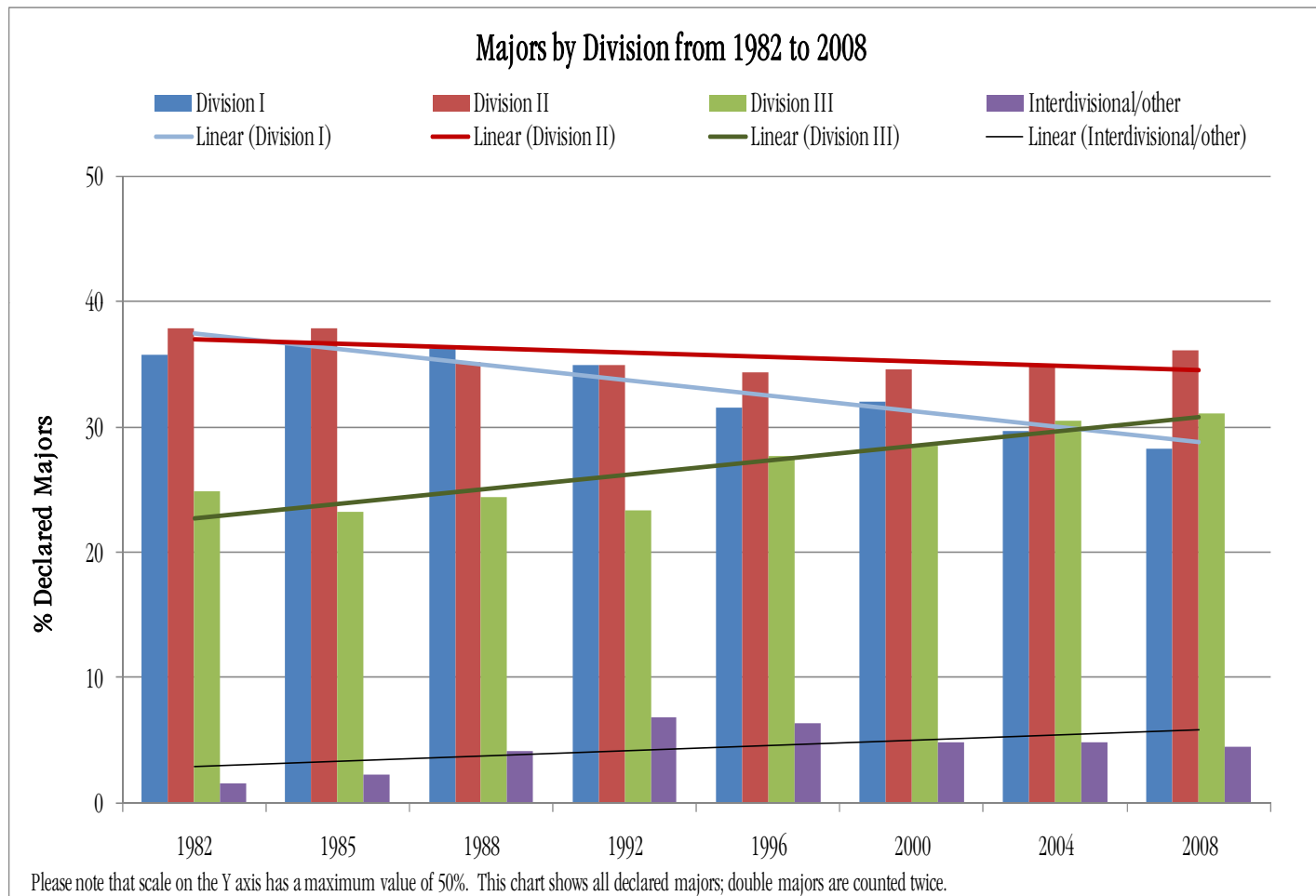


Source: National Science Foundation, Division of Science Resources Statistics, 2009, *Women, minorities, and persons with disabilities in science and engineering: 2009* (NSF 09-305) (Arlington, VA), Tables C.1 and C.5.





What do we Know About Smith?

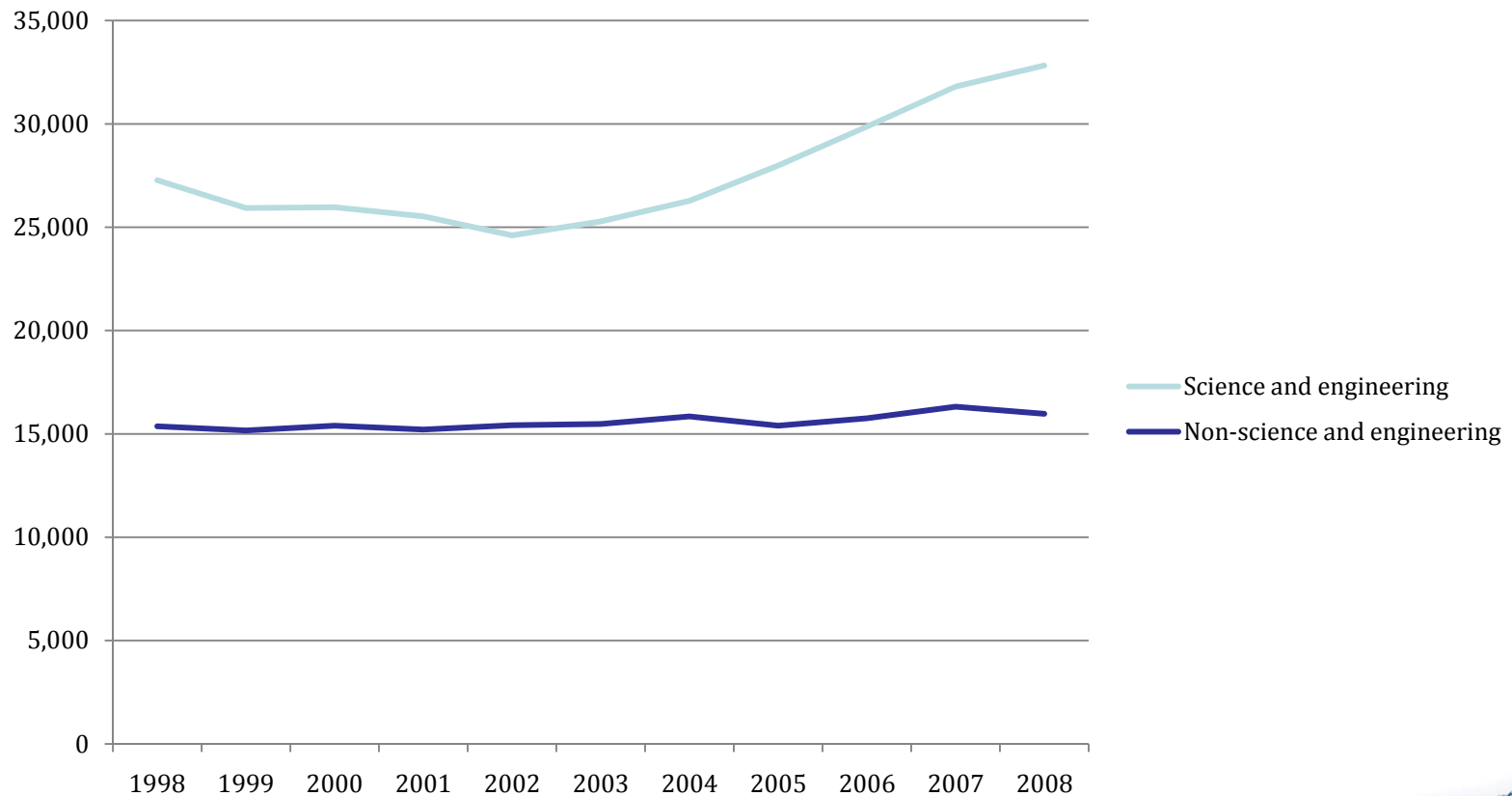


Source: Office of the Registrar. Majors Official Counts, 1982-2008.





Doctorates Awarded in Science and Engineering and non-S&E Fields: 1998–2008



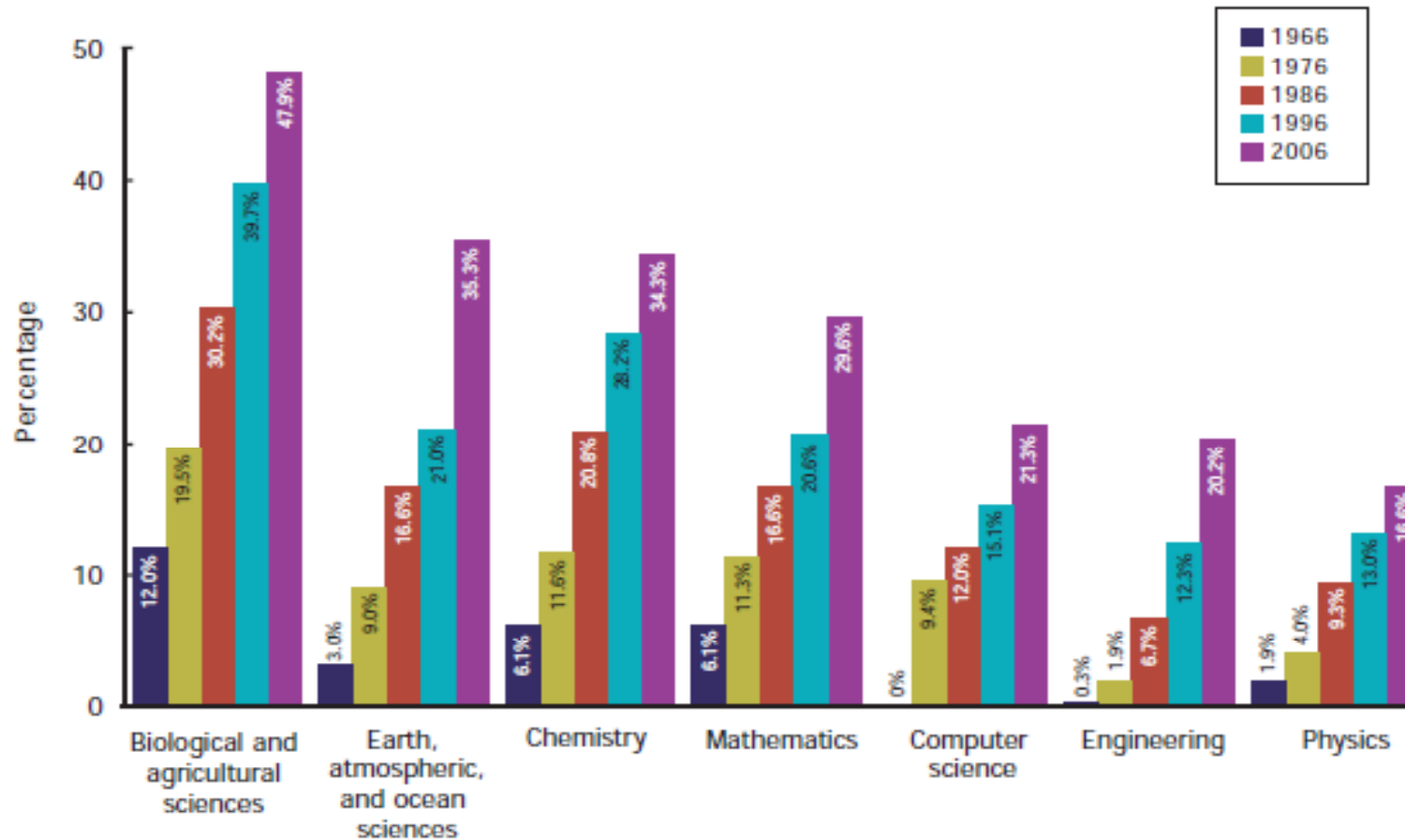
SOURCE: NSF/NIH/USED/NEH/USDA/NASA, 2008 Survey of Earned Doctorates.



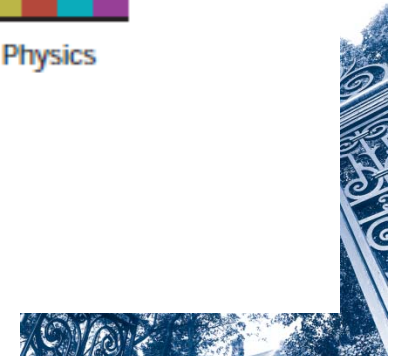


AAUW: Why So Few? 2010

Figure 9. Doctorates Earned by Women in Selected STEM Fields, 1966–2006



Source: National Science Foundation, Division of Science Resources Statistics, 2008, *Science and engineering degrees: 1966–2006* (Detailed Statistical Tables) (NSF 08-321) (Arlington, VA), Table 25, Author's analysis of Tables 34, 35, 38, & 39.



What do we Know About Outcomes?

- Sources for Outcomes Data
 - Higher Education Data Sharing (HEDS) Consortium. March 2010. HEDS Weighted Baccalaureate Origins Study.
 - Carnegie Foundation for the Advancement of Teaching (CFAT). February 2010. Web. 17 February 2010. http://classifications.carnegiefoundation.org/resources/cc2005_public_file_021110.xls
 - National Center for Education Statistics (NCES). February 2010. Integrated Postsecondary Education Data Survey (IPEDS). Web. 12 February 2010. <http://nces.ed.gov/ipeds>
 - National Science Foundation (NSF). February 2010. WebCASPAR. Web. 12 February 2010. <http://caspar.nsf.gov>
 - 2009 Alumnae Survey
 - Banner Outcomes Data





PhD Production

- Baccalaureate Origins Data (SED) is very reliable, but is limited to examining one desirable outcome (ignores any other terminal degrees, including professional degrees like MDs and JDs).
- Recent NSF InfoBrief listed top 50 institutions by weighted baccalaureate origin in S&E; Smith did not appear. Further inquiries identified Smith's rank as 64 and S&E PhDs per 100 origins as 4.9 (50th ranked institution had 5.3 PhDs per 100 origins).





PhD Production

- There are many ways to slice data given the pieces of information compiled and cleaned HEDS (Final universe of 1533 BO colleges and universities)
 - Carnegie Classification
 - Baccalaureate Origins (Overall and Women-Only)
 - Bachelor's Degrees Awarded (Overall and Women-Only)
- For this presentation, universe of study narrowed to “women-only “ (for both Baccalaureate Origins and Bachelor's Degrees Awarded) and by Carnegie classified Baccalaureate Colleges.
- Data presented in 10 Year Sums to smooth out year to year variability. Non-overlapping samples.





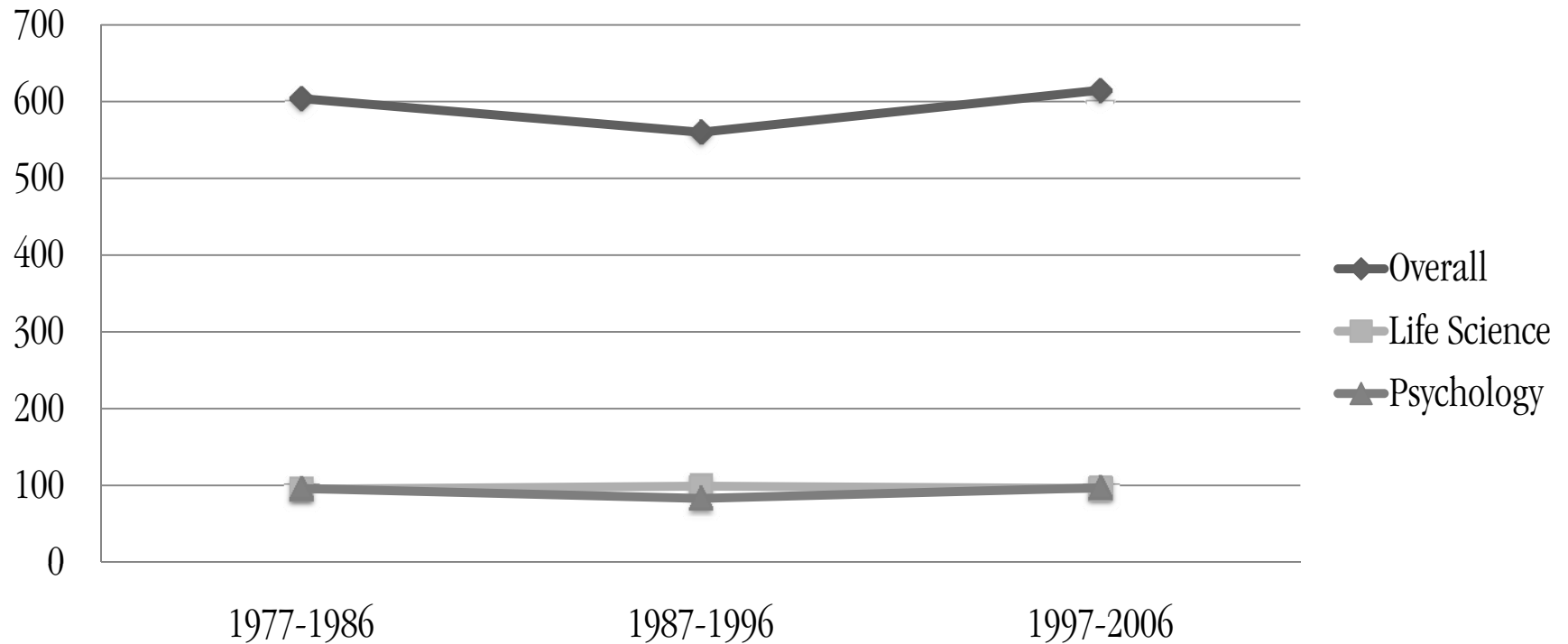
PhD Production

- Different ways of summarizing data (and for different purposes)
 - Baccalaureate Origins: Count of Doctorate recipients who earned their Bachelor's degree at the listed institutions
 - Proportion: Compare institutions' origins divided by the numbers of Bachelor's Degrees awarded (weight or yield)
 - Rank institutions by unweighted counts of origins
 - Rank institutions' origins weighted by their bachelor's degree production





Doctorates Awarded to Smith Alumnae



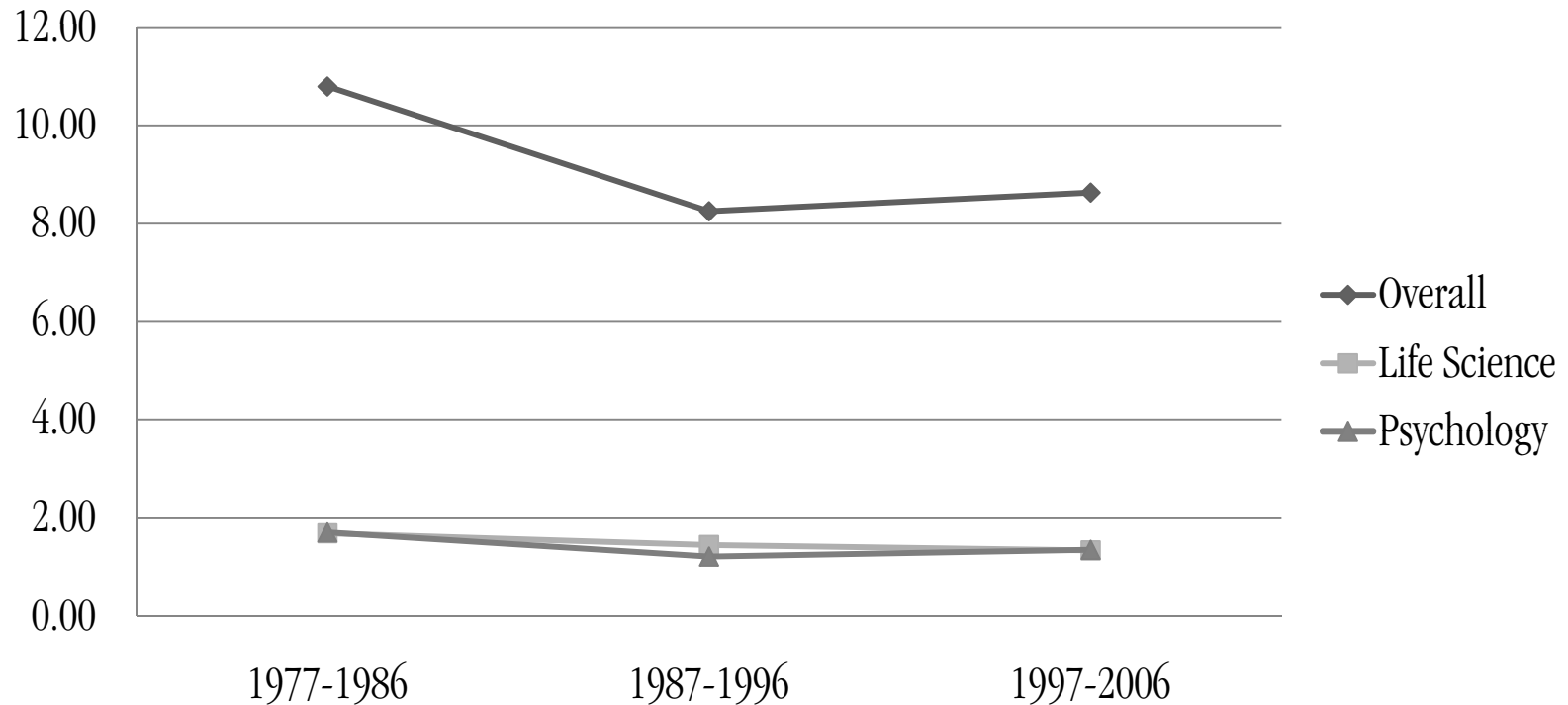
	Overall	Life Science	Psychology
1977-1986	604	95	96
1987-1996	560	99	83
1997-2006	615	96	97

Source: Weighted Baccalaureate Origins Study. March 2010.
The Higher Education Data Sharing (HEDS) Consortium





PhDs per 100 Smith Graduates



	Overall	Life Science	Psychology
1977-1986	10.79	1.70	1.72
1987-1996	8.25	1.46	1.22
1997-2006	8.63	1.35	1.36

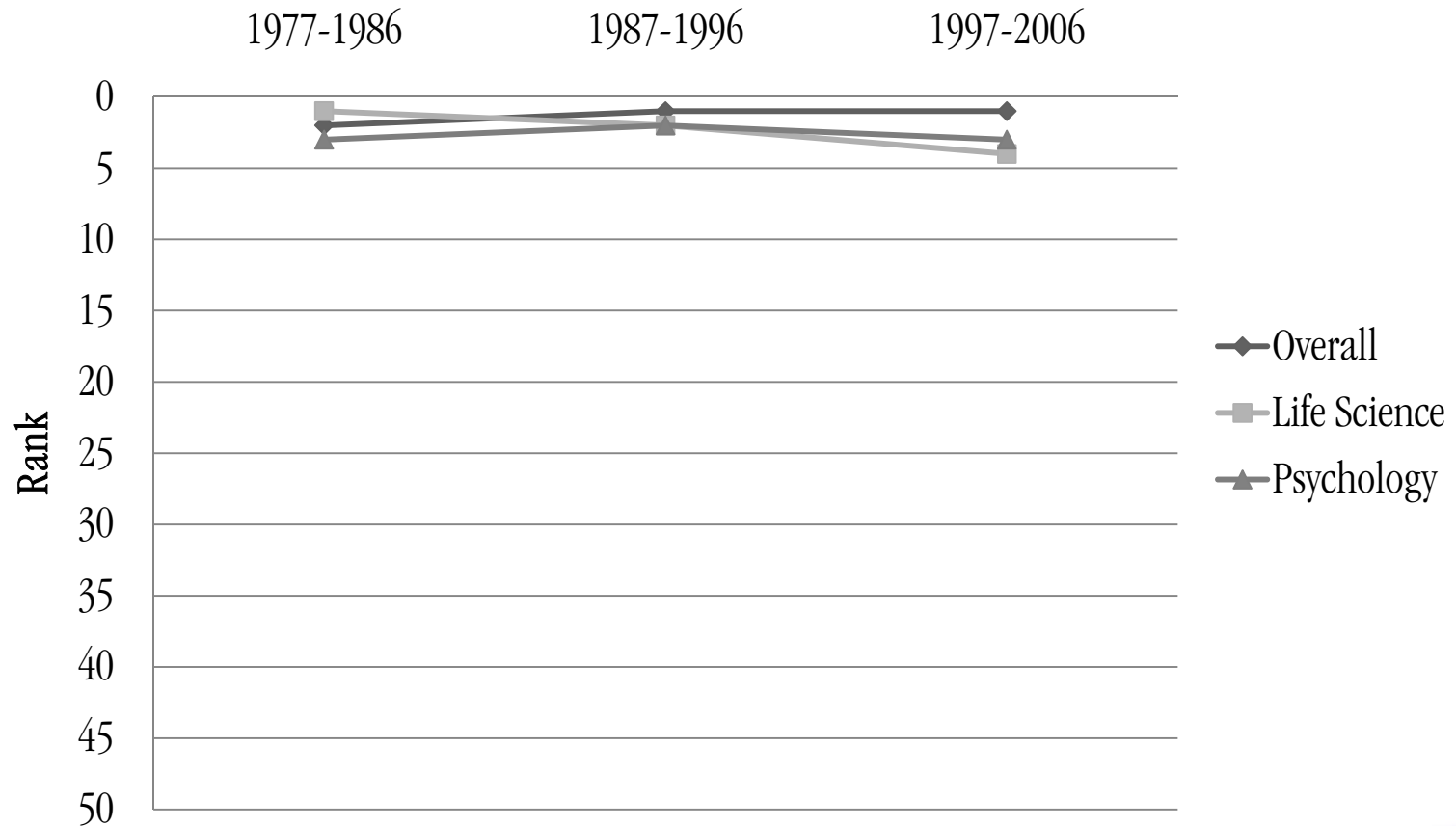
Proportion calculated is number of PhDs awarded to alumnae over number of all baccalaureates awarded 10 years prior (example: PhDs awarded to alum 1997-2006 divided by Smith Baccalaureate Completions 1987-1996)

Source: Weighted Baccalaureate Origins Study. March 2010.
The Higher Education Data Sharing (HEDS) Consortium





Unweighted Rank for Baccalaureate Origins (Women Only) among Baccalaureate Colleges

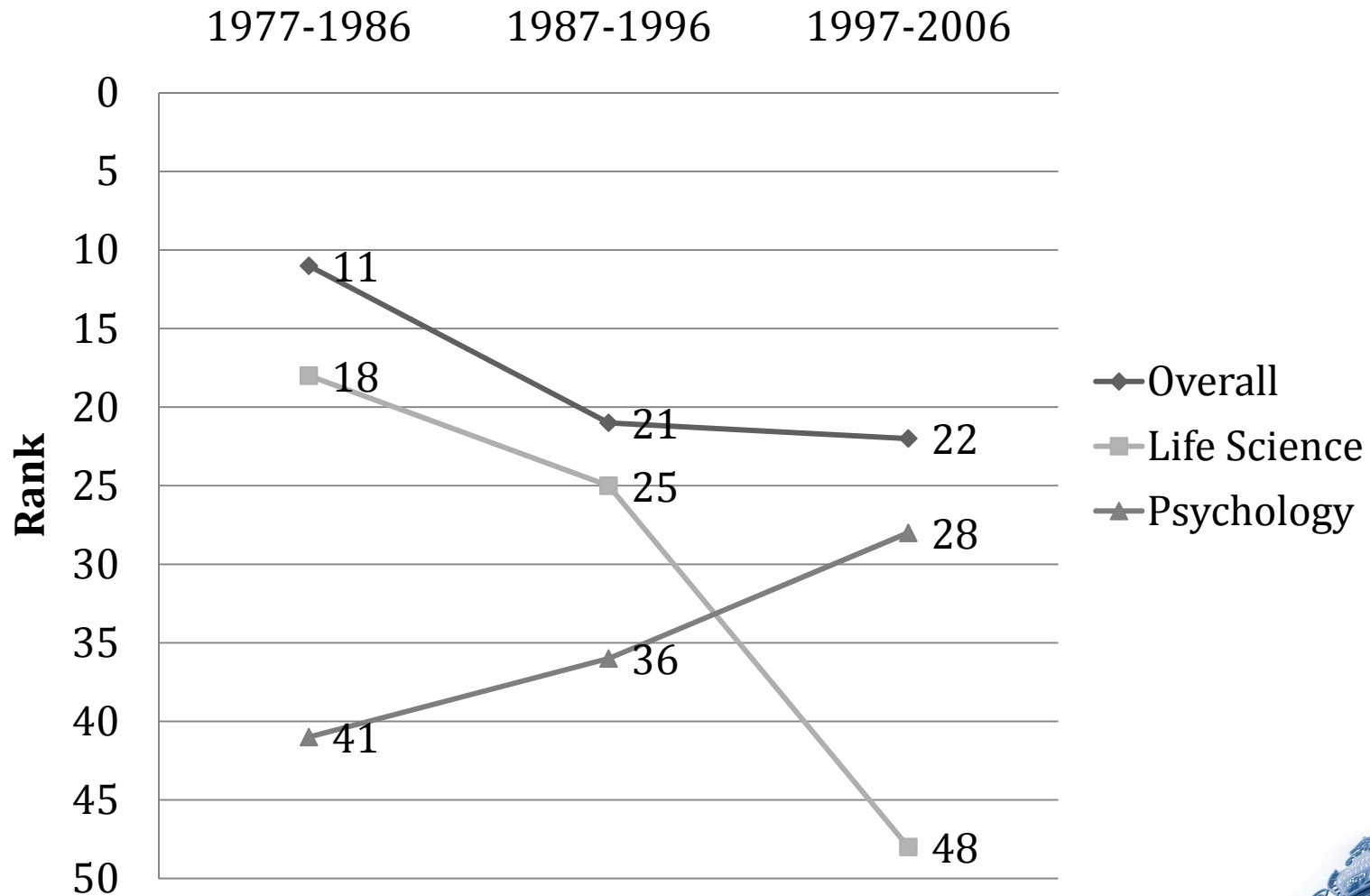


Source: Weighted Baccalaureate Origins Study. March 2010.
The Higher Education Data Sharing (HEDS) Consortium





Weighted Rank for Baccalaureate Origins (Women Only) among Bacclaureate Colleges



Source: Weighted Baccalaureate Origins Study. March 2010.
The Higher Education Data Sharing (HEDS) Consortium





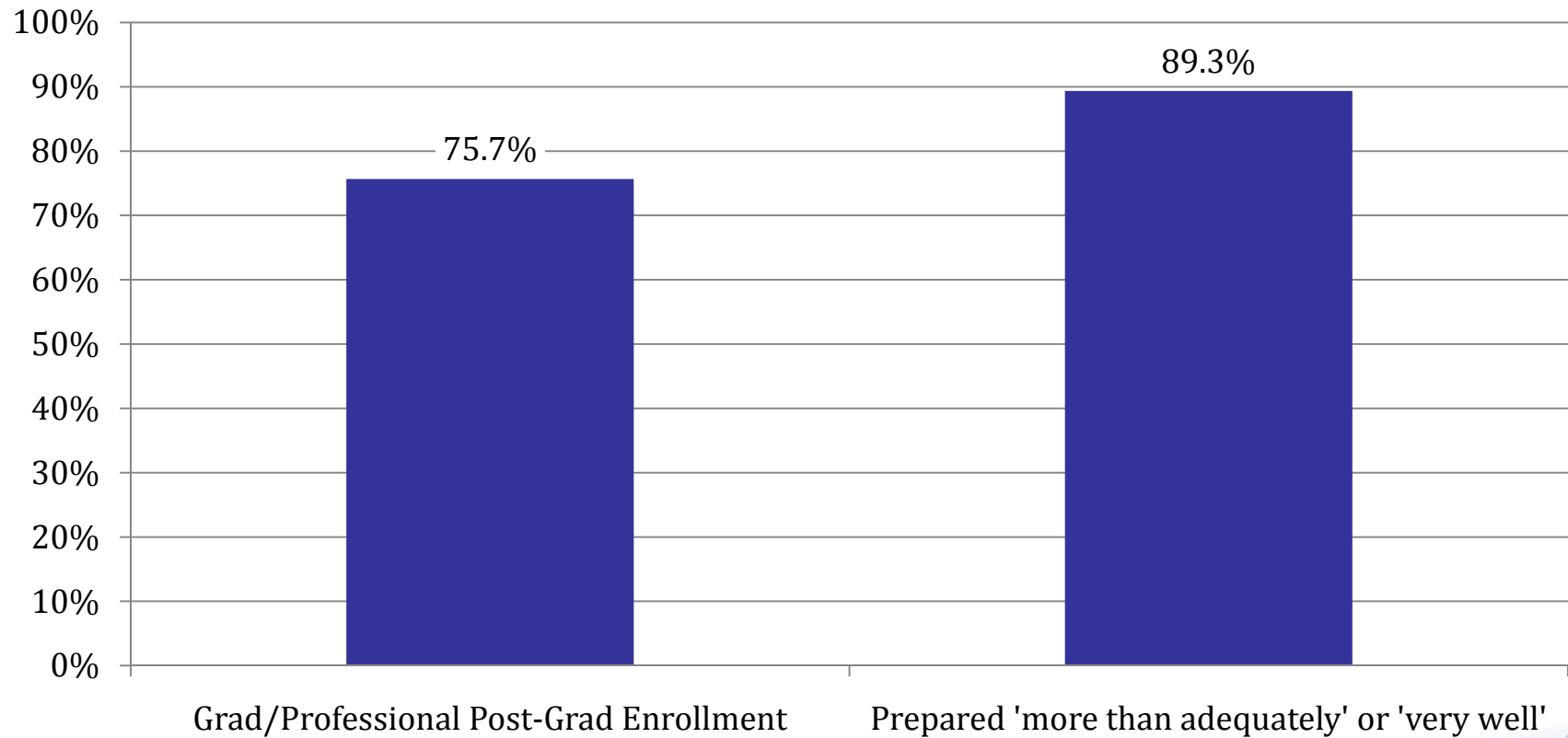
What are They Doing?

- Alumnae Survey 2009
 - Administered annually
 - For 2009: 2, 5, 10, 15, and 20 years out
 - Response Rates
 - 2 yr out - 53.6%
 - 5 yr out - 55.8%
 - 10 yr out - 50.7%
 - 15 yr out - 48.8%
 - 20 yr out - 53.1%
 - Online questionnaire with mail and phone outreach





Advanced Education

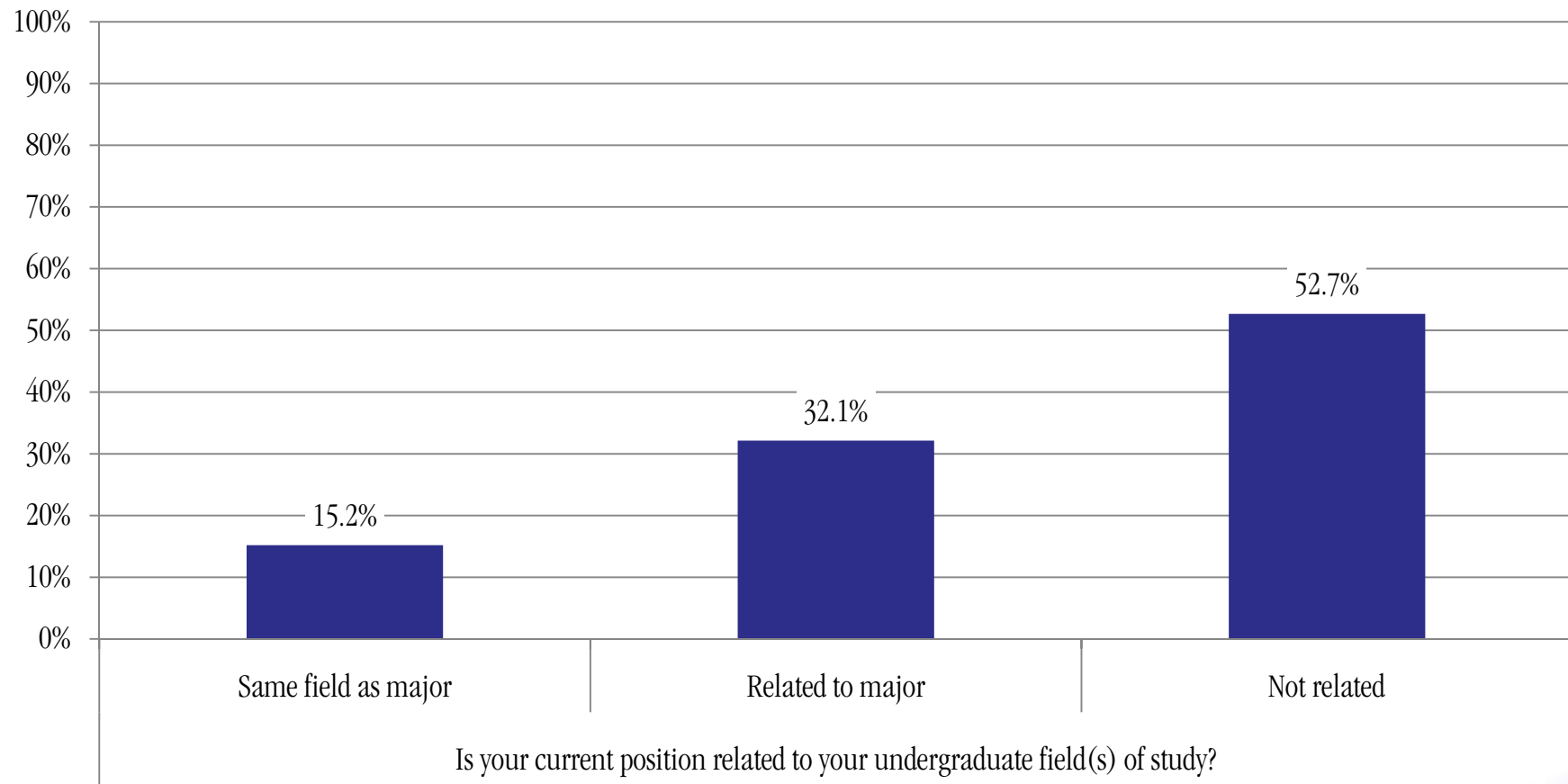


Source: 2009 Smith College Alumnae Survey data for those 10,15, and 20 years post-graduation.





Education and Work: Relation of Career to Major

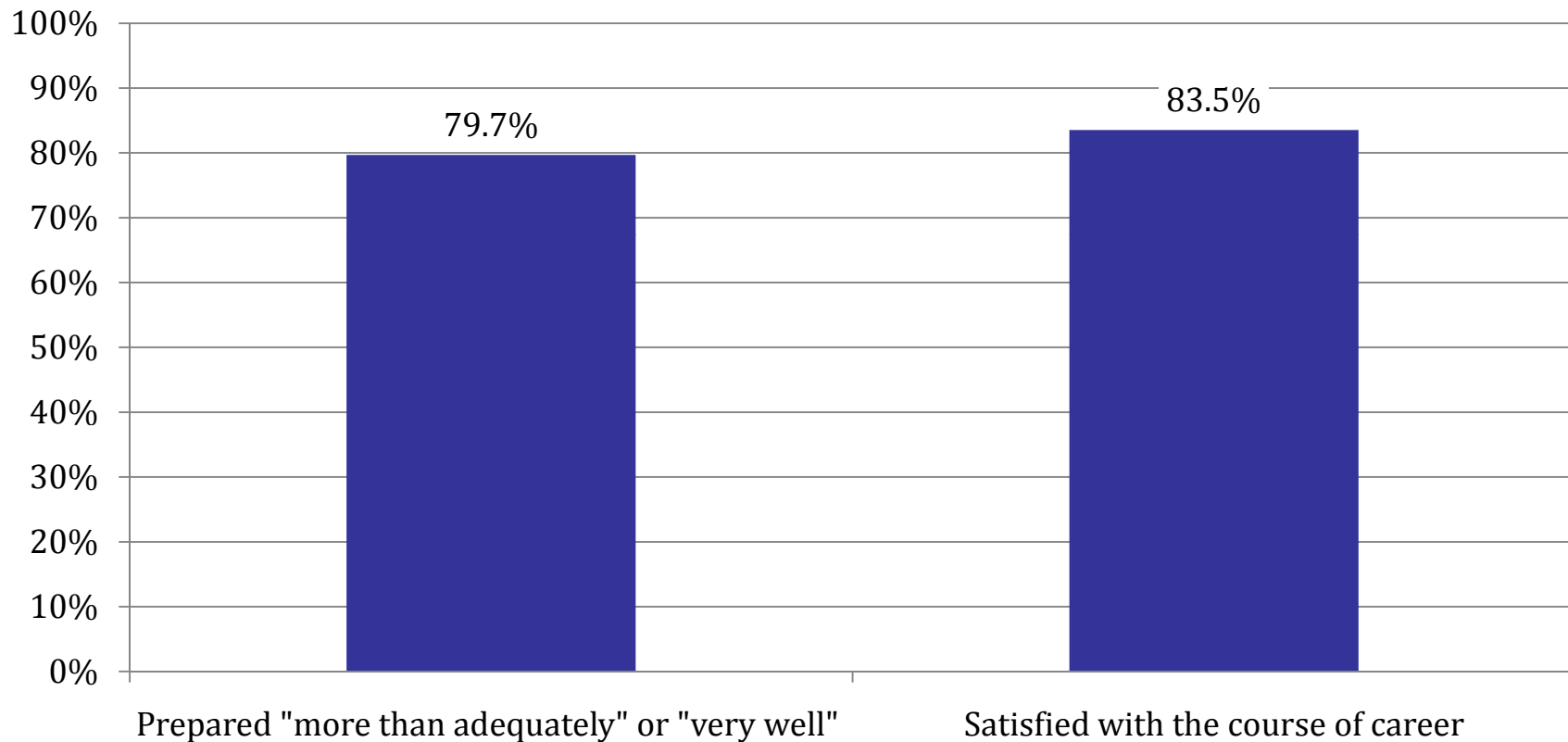


Source: 2009 Smith College Alumnae Survey data for those 10,15, and 20 years post-graduation.





Education and Work: Career Preparation & Satisfaction

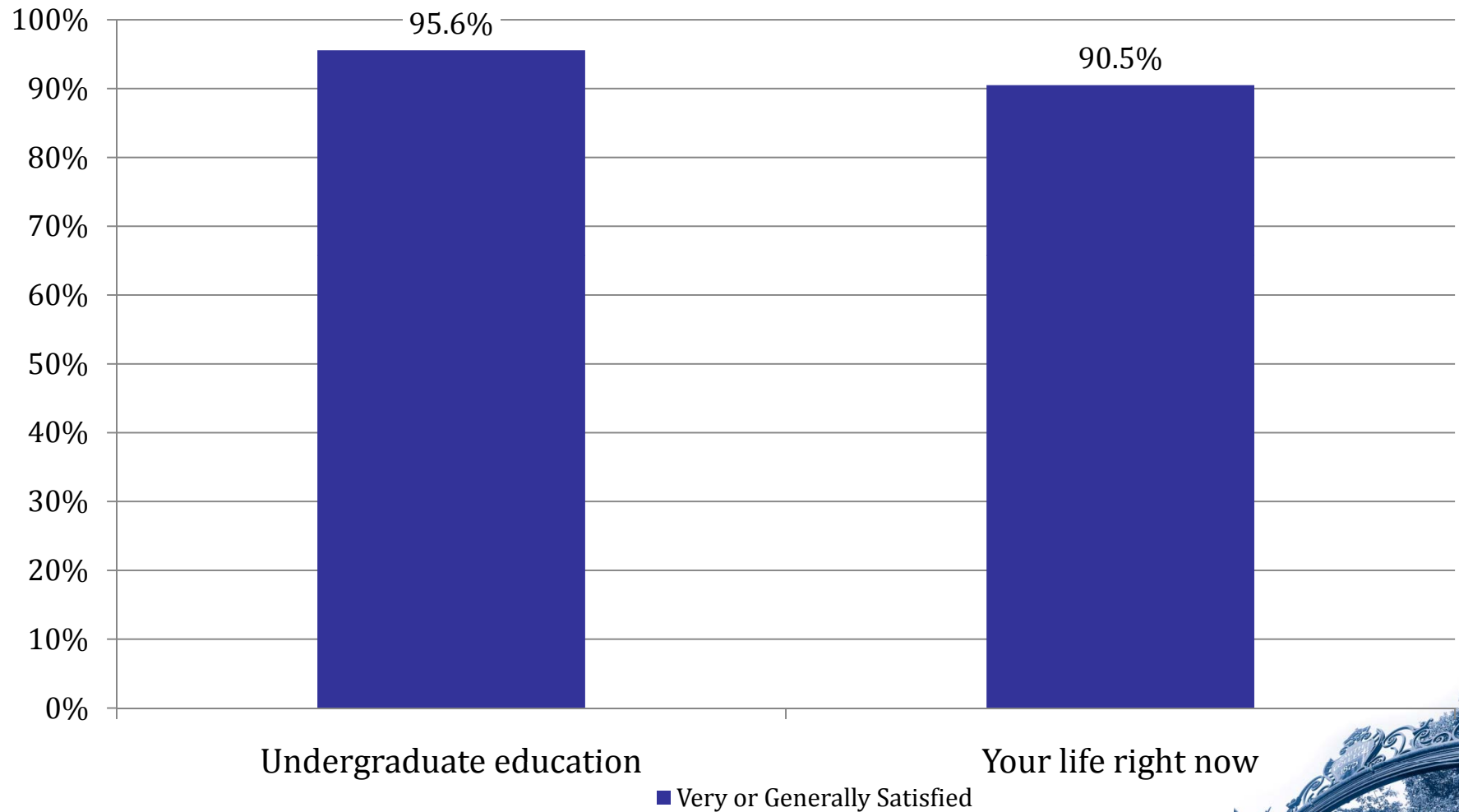


Source: 2009 Smith College Alumnae Survey data for those 10,15, and 20 years post-graduation.





Satisfaction with Smith Education & Current Life



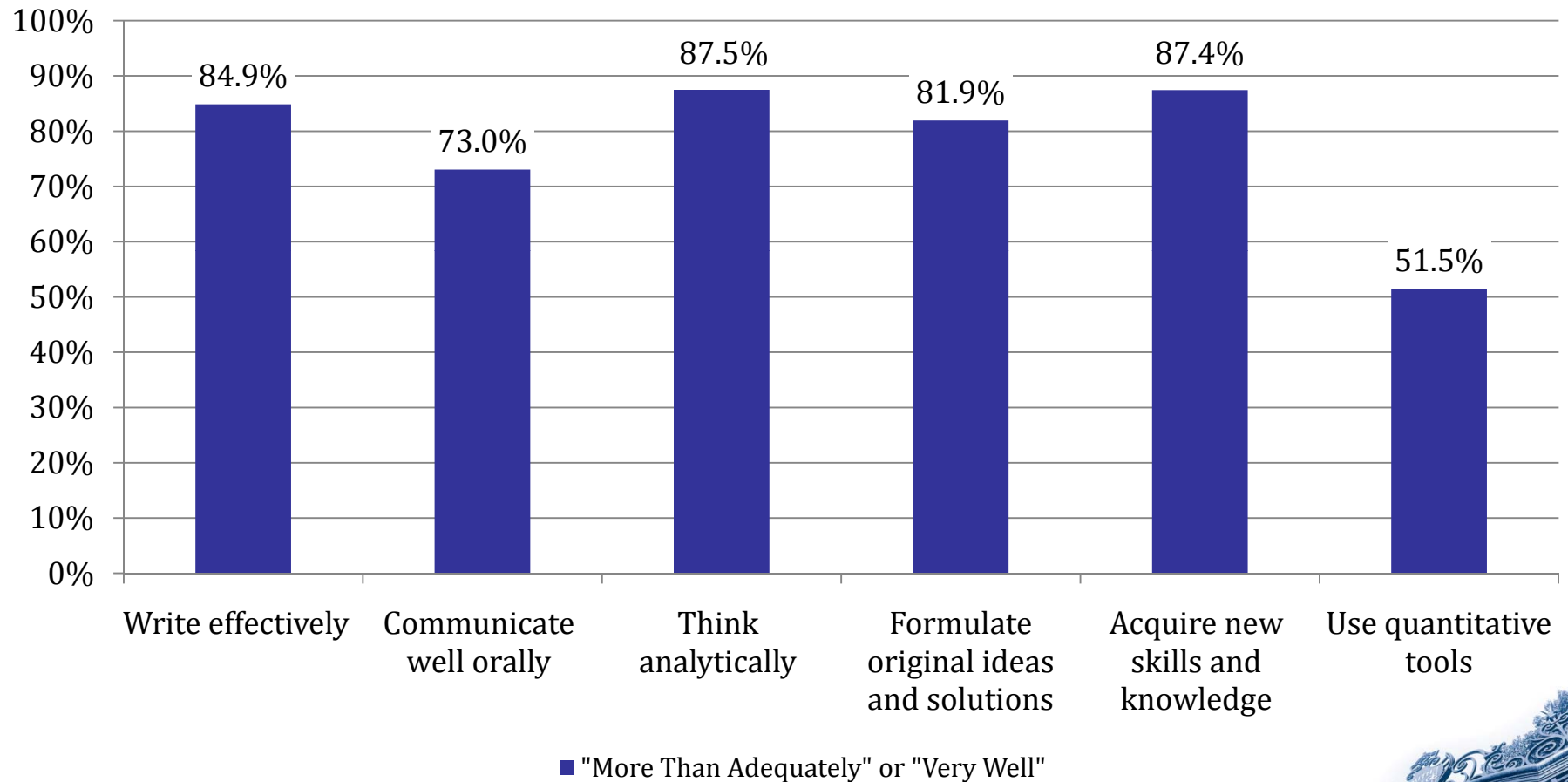
Source: 2009 Smith College Alumnae Survey data for those 10,15, and 20 years post-graduation.



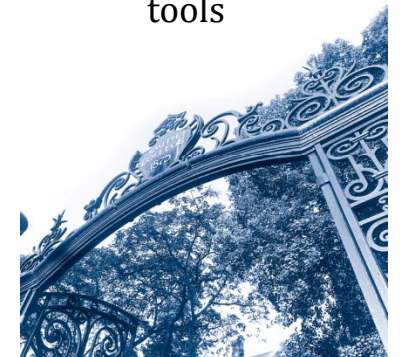


Perspective on Smith Education: Skills

How well do you think your undergraduate experience prepared you?



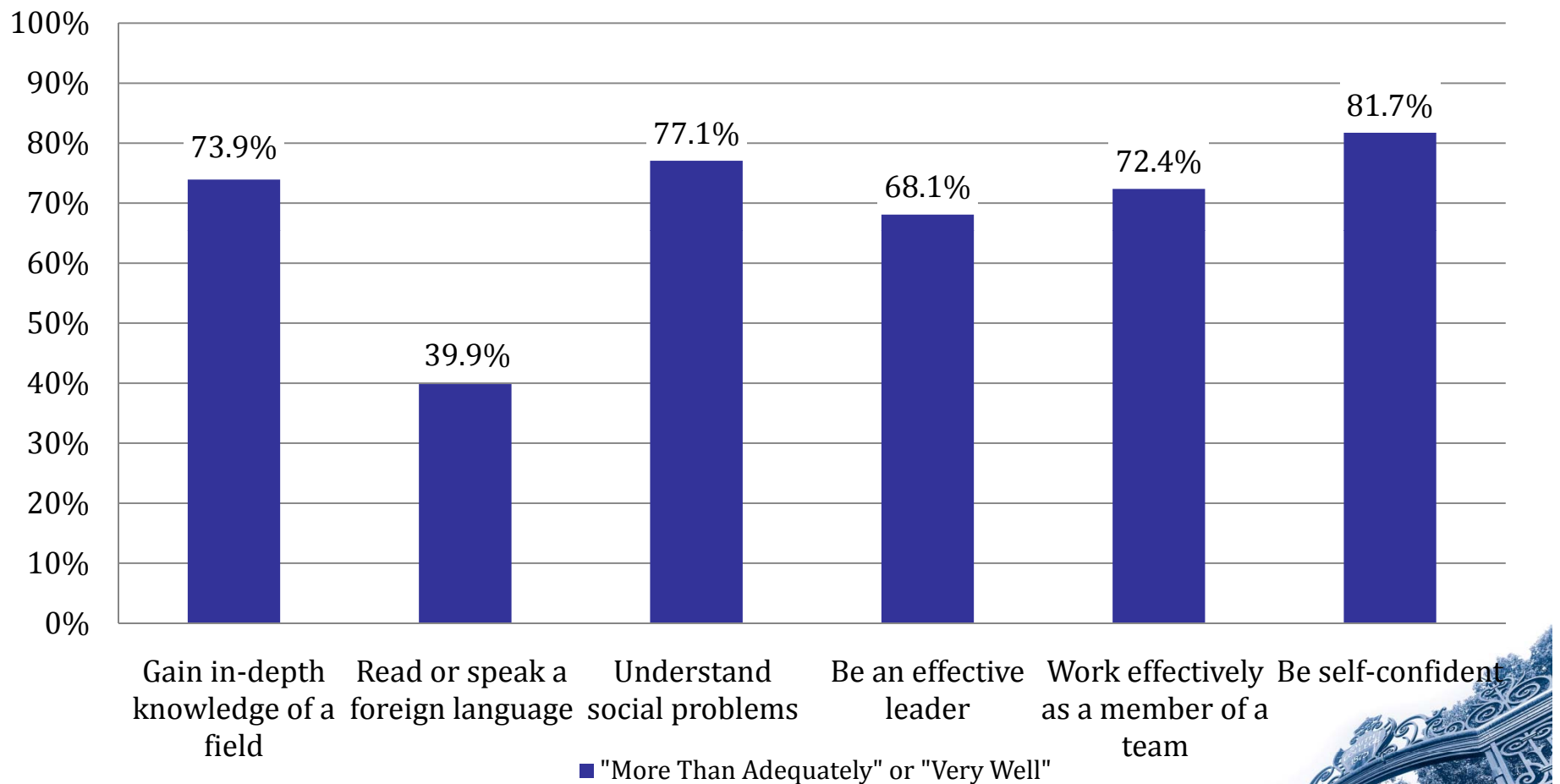
Source: 2009 Smith College Alumnae Survey data for those 10,15, and 20 years post-graduation.



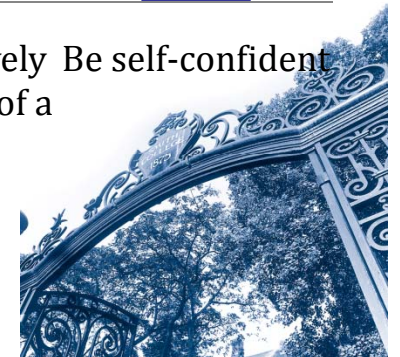


Perspective on Smith Education: Skills

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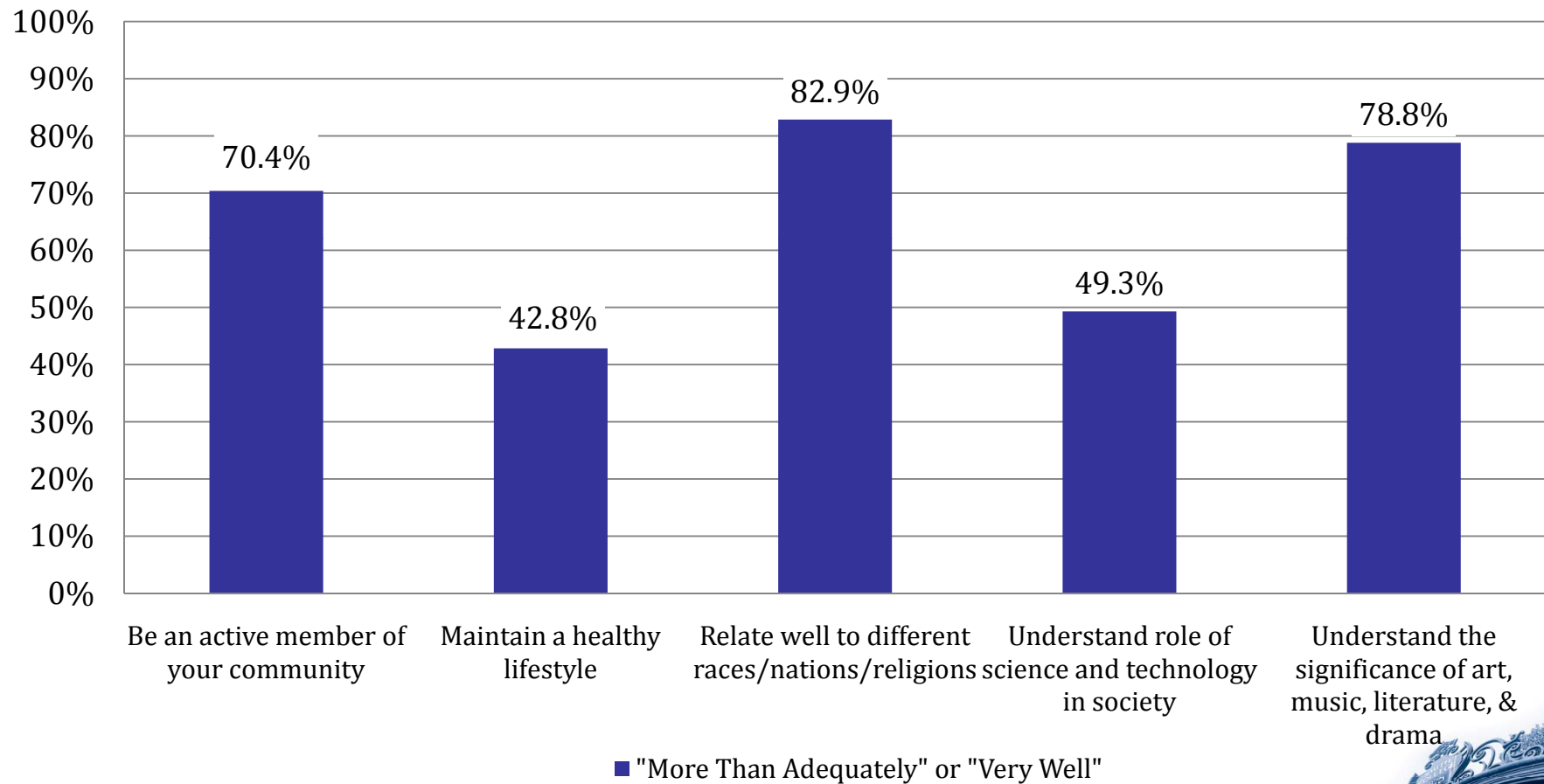
Source: 2009 Smith College Alumnae Survey data for those 10,15, and 20 years post-graduation.



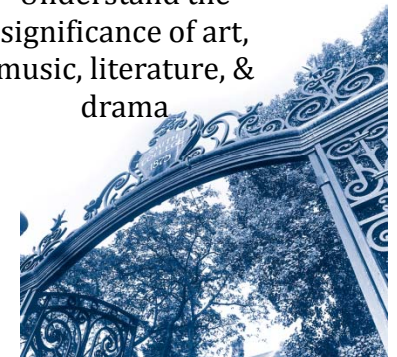


Perspective on Smith Education: Skills

How well do you think your undergraduate experience prepared you?



Source: 2009 Smith College Alumnae Survey data for those 10,15, and 20 years post-graduation.





Impact of Science Programs at Smith

- Alumnae survey
 - Science majors
 - Classes 1974-2007
 - 67% response rate (n=786)
- Comparison of graduate degree attainment
 - SURF participants
 - non-SURF
- Results based on bivariate analysis
 - 73% of SURF participants with graduate degree outcome
 - 57% of non-SURF participants with graduate degree outcome

Source: Lopatto, David and Carol Trosset. "Report on the Smith College Alumnae Survey."
Clark Science Center Director's Office, Smith College. (2008)
Banner Office of the Registrar, Smith College.





Reasons for Re-Analyzing Results from Prior Study

- Systematic differences between SURF participants and non-SURF
- Control for confounding variables
 - Total SAT score
 - Admissions rating for the student
 - Race/ethnicity
 - Graduation year
- The outcome variable is dichotomous indicator of completion of a graduate degree
- Fit a multiple logistic regression model, a multiple logistic regression model controlling for propensity score, and a matched analysis using the propensity scores

Source: Smith College Science Alumnae Survey. Office of Institutional Research and Educational Assessment. (2008)

Banner: Office of the Registrar, Smith College.





SURF Re-Analysis Results

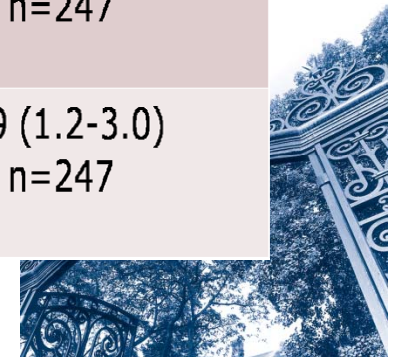
Multiple logistic regression model

- Controlling for total SAT score and the other possible confounders, SURF participants had 1.9 times the odds (95% confidence interval 1.2-3.0) of completing an advanced degree relative to non-SURF participants

Propensity score model

- Controlling for propensity score when including only total SAT score and the other possible confounders, SURF participants had 1.9 times the odds (95% confidence interval 1.2-2.9) of completing an advance degree relative to non-SURF participants

	SAT only Mean (95% Confidence Interval)	Reader Rating Only Mean (95% CI)	Both SAT and Reader Rating Mean (95% CI)
Participated in SURF (Multiple Logistic Regression)	1.9 (1.2-3.0) n=384	2.0 (1.2-3.5) n=269	2.0 (1.1-3.5) n=247
Participated in SURF (Controlling for Propensity Score)	1.9 (1.2-2.9) n=384	2.1 (1.4-3.2) n=269	1.9 (1.2-3.0) n=247





Banner Data

- Outcomes data fields for
 - Contact information
 - Spousal relationship
 - Most recent degree
 - Most recent institution
 - Next most recent degree
 - Next most recent institution
 - 3rd most recent degree
 - 3rd most recent institution
- Information mostly self-reported, but manually updated internally
- Used primarily by Development Office and Alumnae Association for outreach and fund-raising





Next Steps

- Annual alumnae surveys (2, 5, 10 years out)
- Development of alumnae outcomes data set
 - Early design phase, Institutional Intelligence project
 - Purpose: assessment, grant application support, outcomes evaluation
 - Ideas
 - Tracking exam scores
 - Senior Survey data
 - Alumnae Survey data
 - Self-reported alumnae outcomes
- What else? What do we want to know?
- What assessment questions can we answer with outcomes data?
- How can Smith better support faculty with outcomes data?

