Longitudinal Study of Astronomy Graduate Students

Rachel Ivie
Arnell Ephraim
Background

• Resolution adopted at WIA 2003
  – “The American Astronomical Society should commission immediately a longitudinal study of young women in astronomy
  – A similar group of men should be used as a comparison sample
  – Both subjects that remain in the field and those that leave the field should continue to be tracked for the duration of the study.
  – The AAS should commit to continue this study for at least 10 years
  – One goal of this study would be to measure whether there is differential attrition of women from the pipeline and if so, to learn the reasons for it.”

• Funded by AAS Council and AIP in January 2007
Background

• Working group convened by CSWA
  – Pat Knezek
  – Audra Baleisis
  – Susana Deustua
  – Stefanie Wachter
  – Jennifer Neakrase
  – Rachel Ivie

• Data collection began in July 2007
Survey Methodology

- AAS’s junior membership list
- Astronomy and astrophysics graduate students from AIP surveys
- 2056 names collected (grad students in 2006-07)
- Multiple contacts via e-mail and paper mail
- 1576 responses (not all eligible for analysis)
- 800 agreed to participate in future (41% female)
Respondents
Number of Respondents Used in Analysis

- Females: 447
- Males: 696
- Total: 1,143
Demographics

- Female: 39%
- Mean age: 28
- Full-Time: 97%
- Mean Length of Time in Program: 3.4 years
- U.S. Citizen: 77%
- Mothers have college degrees: 64%
- Fathers have college degrees: 71%
- Planning a Doctorate: 91%
Bachelor’s Degrees

- Physics: 53%
- Physics and Astronomy: 25%
- Astronomy: 13%
- Other: 10%
Financial Support

• Research Assistantship: 57%
• Teaching Assistantship: 21%
• Fellowship: 16%
• Other: 6%
Imposter Syndrome

• “Believing that one's accomplishments came about not through genuine ability, but as a result of having been lucky, having worked harder than others, or having manipulated [managed] other people's impressions” (Langford and Clance, 1993)

• Scale adapted for use with astronomy students

• Gender difference predicted

• May be related to attrition
Imposter Scale Items

• People believe I am more competent
• I am afraid others will discover how much knowledge or ability I lack
• In my career through some kind of mistake
• I succeed because I work harder than others
• Success is caused by my high ability
• Highly confident I will succeed in my career
• I’m at least as smart as my peers
Other items

- Climate in my department is welcoming
- Skills to develop into a good researcher
- Skills to develop into a good teacher
- Adequate access to facilities and equipment to develop into a good researcher
- Did you feel you were being mentored
Analysis

• Analyzed with multivariate logit models
• Looking for effects that are independent of other effects

• Independent variables
  – Being mentored
  – Length of time in program
  – Type of support
  – Citizenship
  – Sex
  – Full-time v. part-time
Mentoring Matters

72% felt mentored
Students Who Feel They Are Being Mentored Are More Likely to...

• Find the overall environment in their department to be welcoming
• Report having the skills to develop into a good researcher
• Report having access to adequate facilities/equipment to develop into a good researcher
• Be confident that they will succeed in their future career
• Report that they are at least as smart as their peers
And Less Likely to...

• Report feeling like they are in their current career position through some kind of mistake
Who Is More Likely to Feel Mentored?

• Full-time students
• Students with temporary visas
• The longer a student is in a program, the less likely they are to report being mentored
Length of Time in Program Matters
The Longer a Student is in a Program...

• The more likely they are to report that they are afraid others will discover how much knowledge and ability they lack
• The less likely to be confident that they will succeed in their future career
• The less likely to report having the skills to develop into a good researcher
Gender Differences

• Females are less likely than males to report that the overall environment in their department is welcoming

• Females are less likely than males to feel confident that they will succeed in their future careers

• Females are more likely than males to report that sometimes they are afraid others will discover how much knowledge or ability they lack
• Females are less likely than males to say that the major cause of success in their life is because of their high ability
• Females are more likely than males to say that when they succeed it is because they work harder than others
Findings from Open-Ended Questions
What has been a hindrance to your success?

• Most common response was to talk about personal shortcomings, although women were more likely to do this than men (29% v. 21%)

  – Taking on too many projects. Being a perfectionist. Having difficulties in coming up with new research ideas (Female)
  – Sometime I feel I'm not smart enough for doing this (Female)
  – Fear of and failure to ask questions when unsure. Lack of confidence. Fear of being wrong. Intimidation by and dislike of aggressive intellectual atmosphere of astronomy (Female)
  – My short attention span (Male)
  – My test taking abilities leave much to be desired despite my knowledge of the subject (Male)
Hindrance, part 2

- Women more likely to cite problems with their advisors (12% v. 8%).
- Women more likely to say that they lack background (8% v. 4%).
- Other than advisor, men more likely to cite external factors (10% v. 16%)
  - Lack of resources, opportunity, time, support, funding
  - Problems with research or delays in research
What has helped you succeed?

• Generally, women more likely than men to mention other people
  – One of the most common responses was advisors (28% of women and 23% of men).
  – Women more likely to mention other faculty members (22% v. 10%).
  – Women more likely to mention peers (27% v. 12%).
Next step: funding for follow-up

For more information

Rachel Ivie
Assistant Director
Statistical Research Center
301-209-3081
rivie@aip.org