

Student views of what counts as doing physics in the lab

Taking notes counts but managing does not

Emily M. Stump and N. G. Holmes

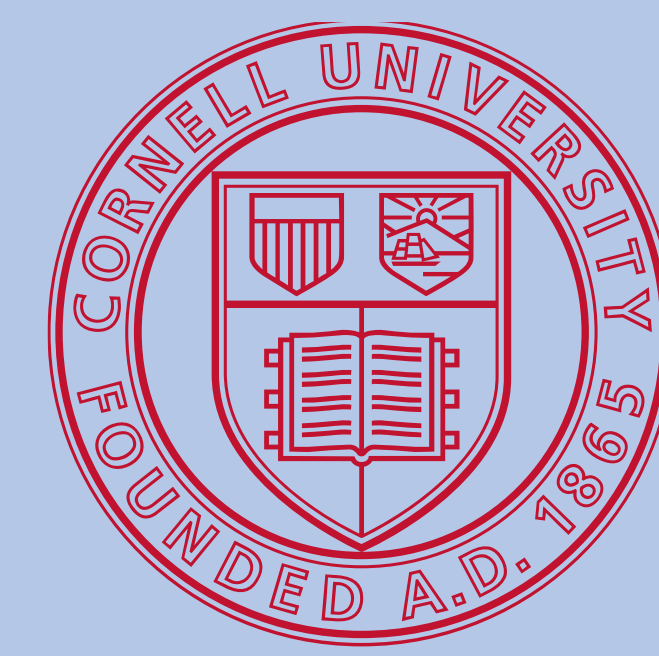
Laboratory of Atomic and Solid State Physics, Cornell University, Ithaca, NY, 14853



ems489@cornell.edu



Stump&Holmes_PERC2022



This material is based upon work supported by the National Science Foundation Graduate Research Fellowship under Grant No. DGE-2139899 and National Science Foundation Grant No. DUE-1836617.

Background

Recognition is important for students' identity development [1].

Men and women tend to take on **different roles** in the lab, with women disproportionately taking on **Notes** and **Managing** [2,3].

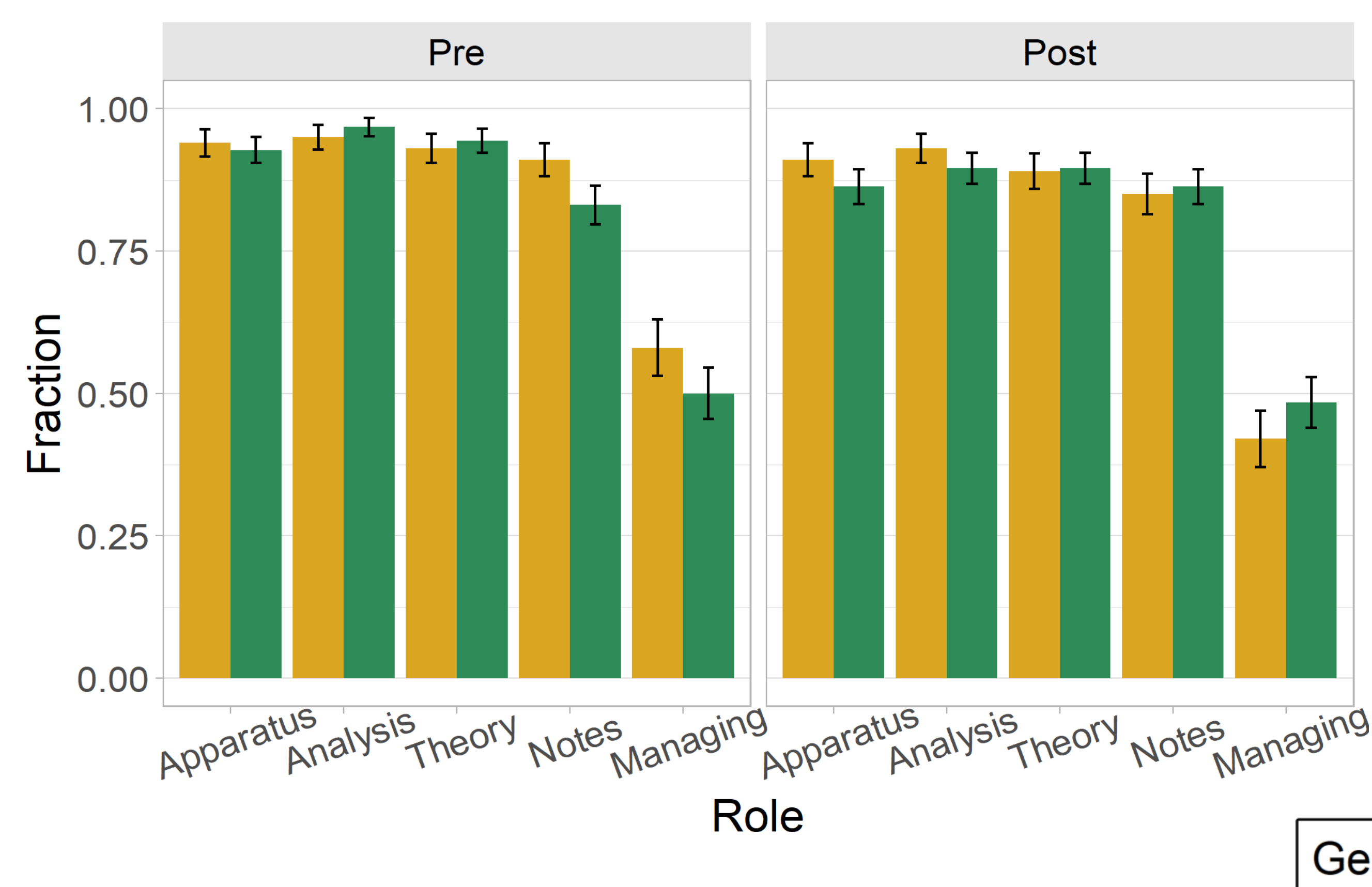
Women's roles may not be valued as part of doing physics, and consequently women may not receive equal recognition to men.

Research questions

1. What lab tasks do students view as part of **doing physics**?
2. How does this vary based on **student gender**?

Intro lab

- First semester
- Engineering majors
- Independent lab units
- 45% women
- $N = 239$

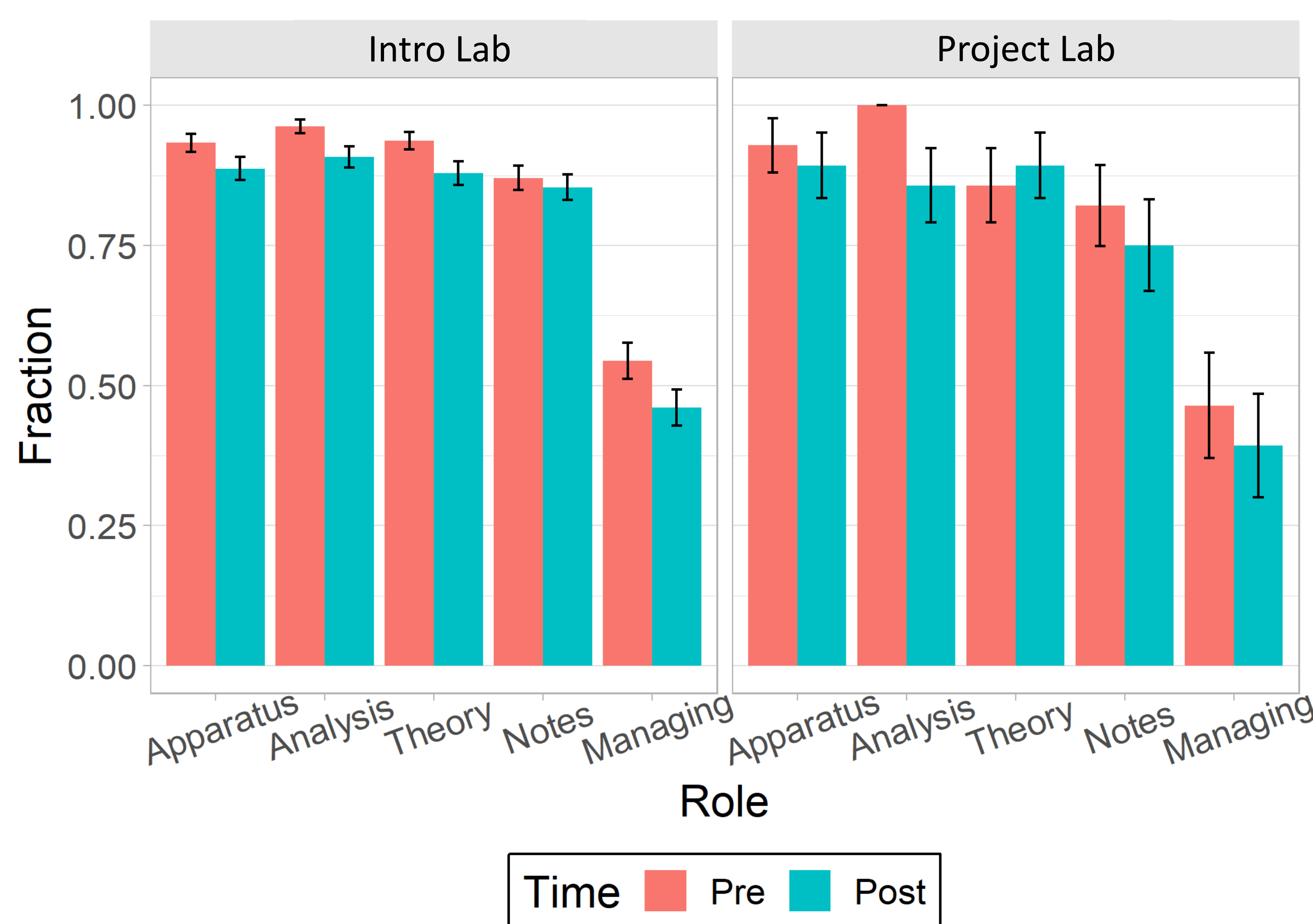


In Intro Lab, results do **not** significantly vary by gender or across time

Survey prompt

Which of the following experiment tasks or roles do you think counts as doing physics? Choose all that apply.

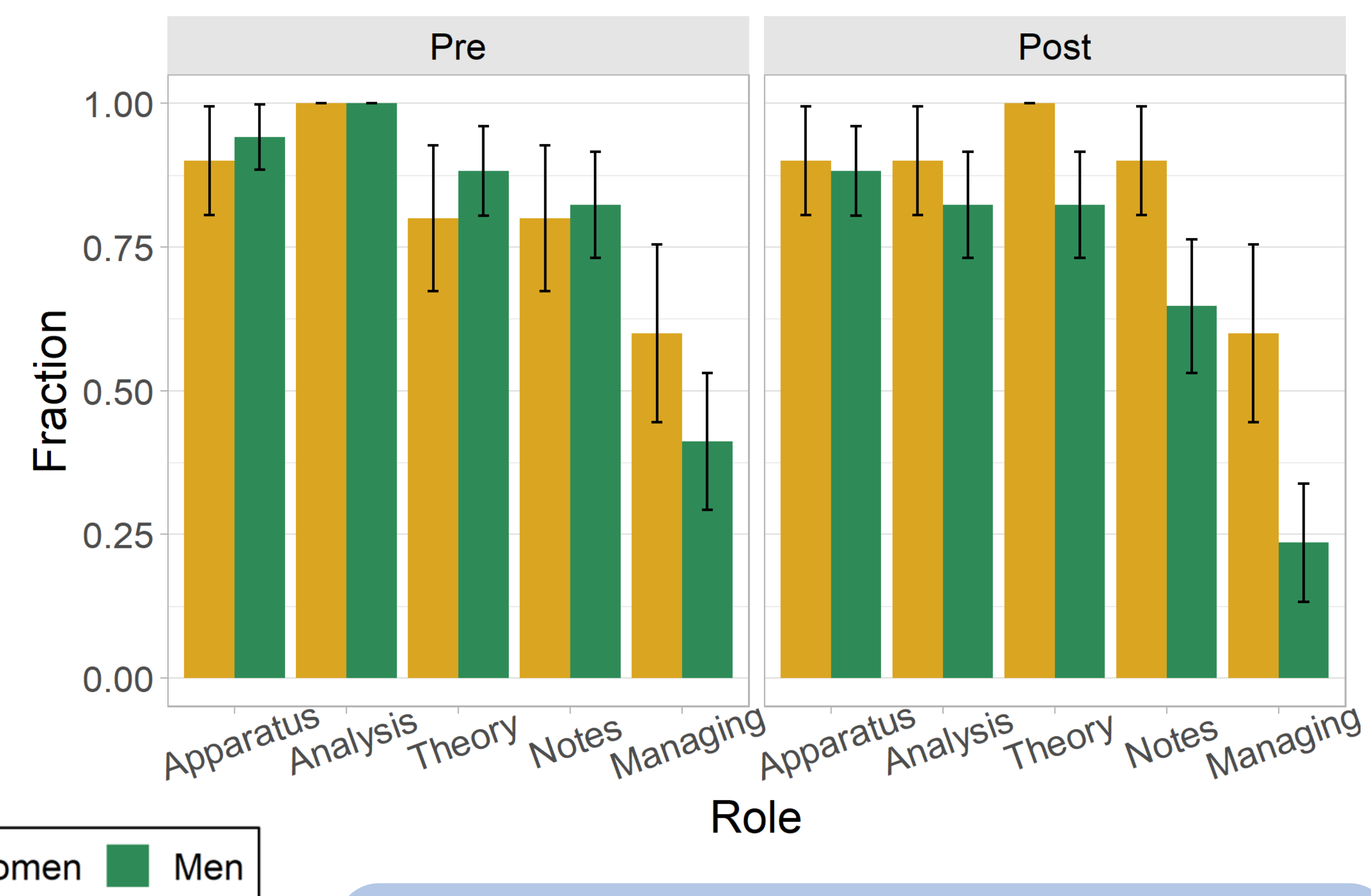
- Setting up the apparatus and collecting data. (**Apparatus**)
- Writing up the lab procedures and conclusions. (**Notes**)
- Analyzing data and making graphs. (**Analysis**)
- Managing the group progress. (**Managing**)
- Exploring the theoretical aspects of the experiment. (**Theory**)



Everything "counts" except for **Managing** in both courses and at both pre and post

Project lab

- Third semester
- Physics majors
- Semester-long project
- 30% women
- $N = 28$



In Project Lab, **gender difference** in attitudes toward **Notes** and **Managing** emerges throughout the semester

Implications

- Students who take on a **Notes** role (primarily women) are likely receiving recognition as physicists.
- Students who take on a **Managing** role (primarily women) are likely **not** receiving recognition.
- Women in the Project Lab place more value on **Managing** and **Notes** than men by the end of the course, so women may receive less recognition in this majority-men course. This is concerning given that managing and notes are especially important in the Project Lab.

Future work

- Does role taken on impact student views of what counts as doing physics?
- What causes students' views to shift (or not) throughout a course?
- How does role taken on impact students' physics identity?

References

- [1] Z. Hazari, G. Sonnert, P. M. Sadler, and M. Shanahan, *Journal of Research in Science Teaching* **47**, 978 (2010).
- [2] K. N. Quinn, M. M. Kelley, K. L. McGill, E. M. Smith, Z. Whipps, and N. G. Holmes, *Phys. Rev. PER* **16**, 010129 (2020).
- [3] D. Doucette, R. Clark, and C. Singh, *European Journal of Physics* **41**, 035702 (2020).