Advancing STEM biomedical career tracks through an undergraduate research program at a large HSI

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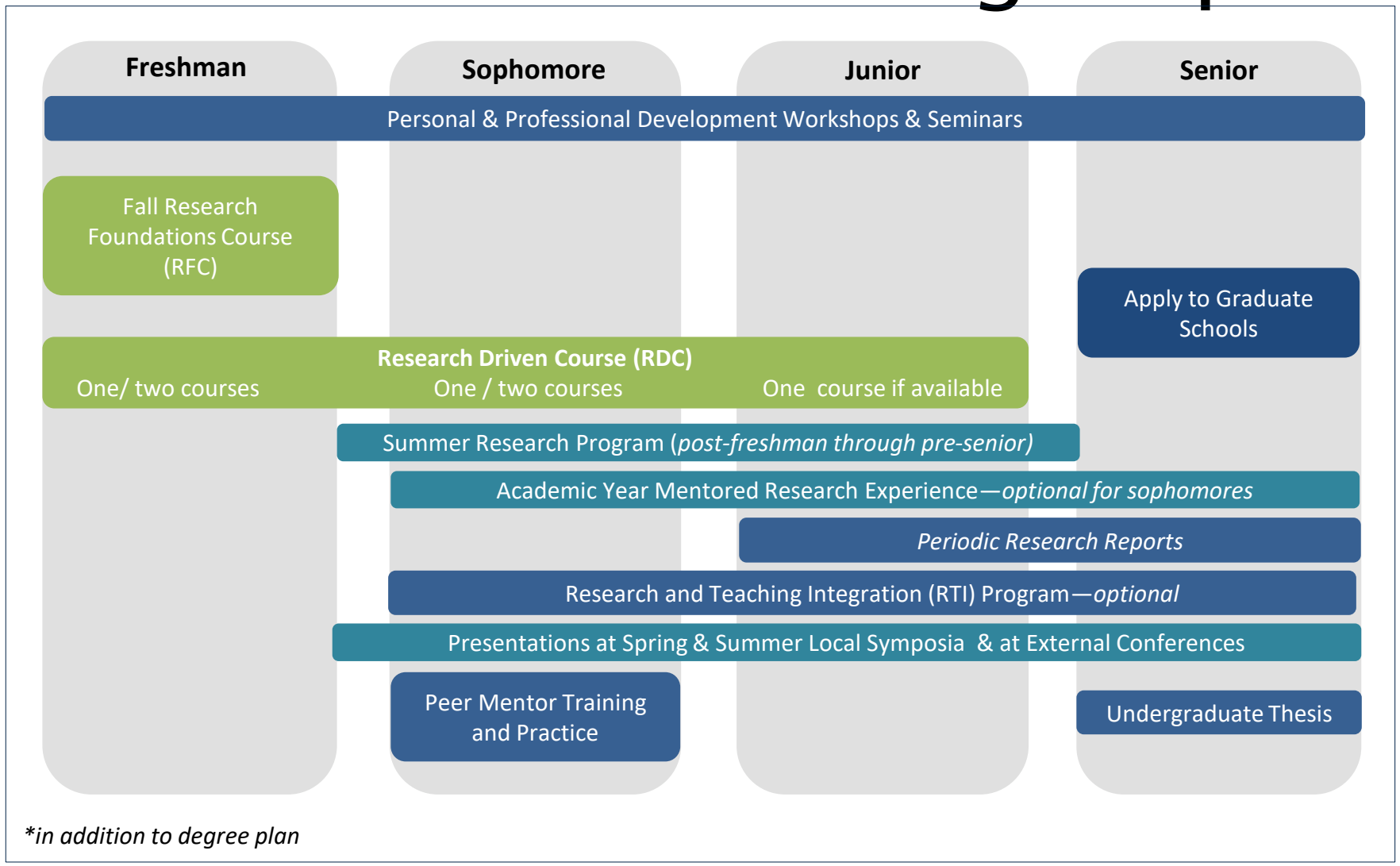
Introduction

- Colleges and universities have created undergraduate research experiences (UREs) as part of their students' development.
- UREs encourage students to enroll in graduate school and continue conducting research in STEM.
- One of the main effects of UREs is an increase in self-efficacy and career ambitions (Carpi et al., 2017).
- Researchers have shown that UREs have helped undergraduate students in the process of continuing with a career in STEM (Adedokun et al., 2012; Ghee et al., 2016).

Research Focus

- Examine the primary characteristics of students that participated in a URE at a large research intensive HIS
  - Compare those who chose biomedical tracks vs non-biomedical tracks
  - Triangulate data from qualitative and quantitative sources

BUILDing SCHOLARS Student Training Sequence



*in addition to degree plan

Program Intervention Activities

Interventions Offered by Research Program

Professional Development Workshops:

- Peer mentor and research mentee training
- Responsible Conduct of Research
- Writing Intensive
- Developing research presentations
- Applying to graduate school
- GRE training
- Research and Teaching Integration training

Parents are invited to:

- Orientations for new cohorts,
- Program welcome panels and breakout groups,
- Biomedical research career workshop/panel,
- Pre-departure orientation for the summer program at research partner institutions
- Symposia

Other Interventions:

- Course-based research experiences
- Mentored research experiences
  - Academic year with university mentors
  - Summer with mentors at partner institutions
- Thesis writing
- Local research symposia with presentation judging and awards

  Social gatherings with Principal Investigators (PIs) and mentors

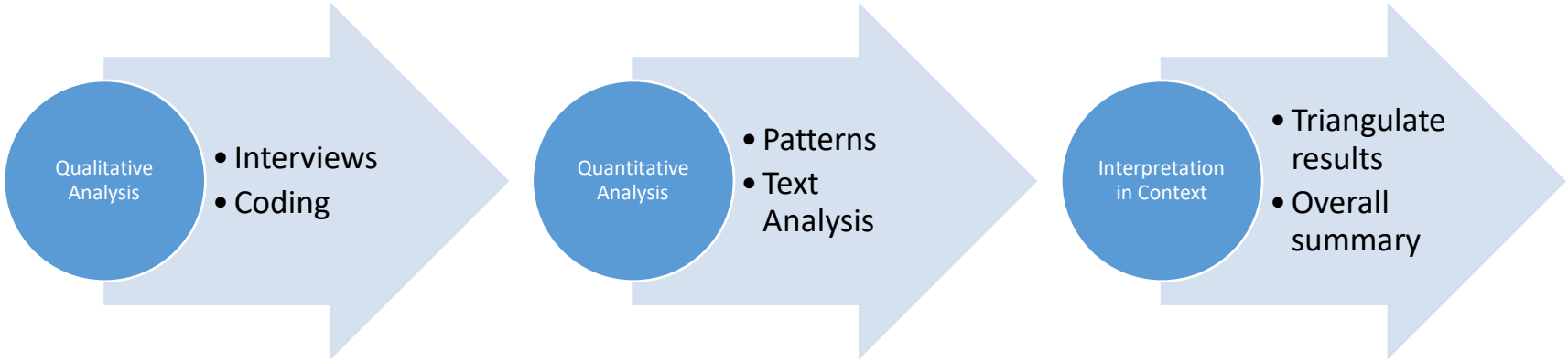
Economic Support:

- Tuition scholarship
- Monthly stipend (including summer)
- Summer research at research partner institutions
- Tutoring and supplemental instruction

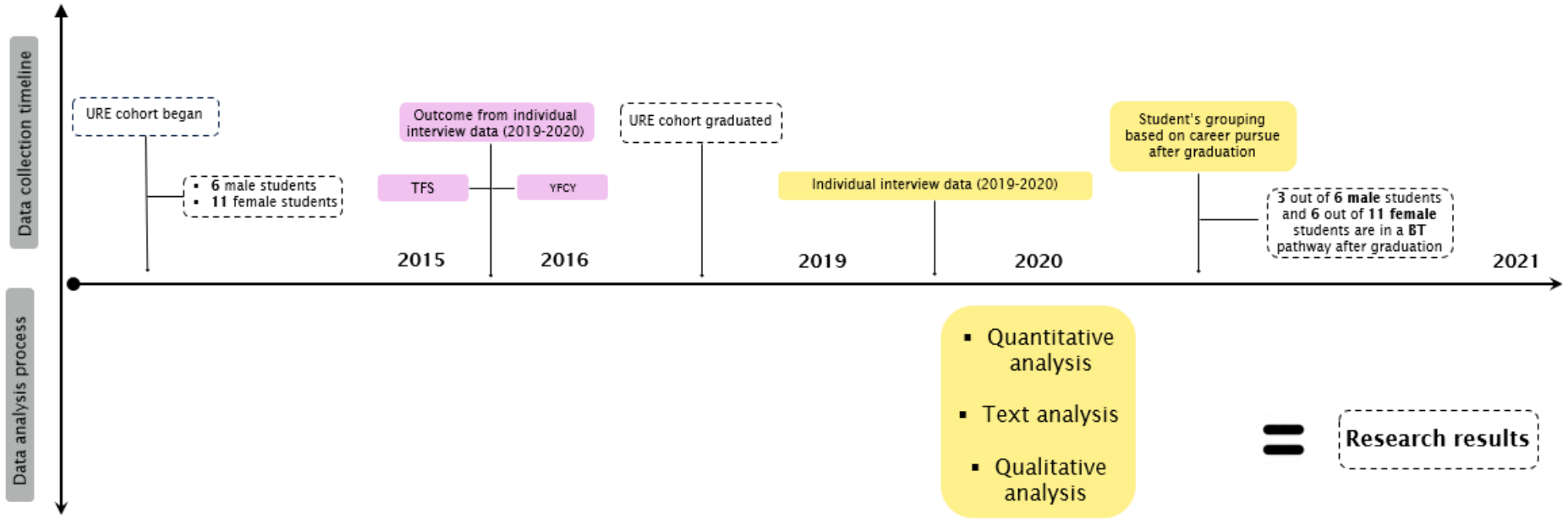
  Travel awards to present at external conferences

Methodology: Data Collection

- Mixed Sequential Design



Study Plan


Data collection timeline
URE cohort began
6 male students
11 female students
Outcome from individual interview data (2019-2020)
TFS
YFCY
URE cohort graduated
Individual interview data (2019-2020)
Student's grouping based on career pursue after graduation
3 out of 6 male students and 6 out of 11 female students are in a BT pathway after graduation
2015
2016
2019
2020
2021
Data analysis process
Quantitative analysis
Text analysis
Qualitative analysis
Research results

Constructs

Academic Self Concept	Measure of students' beliefs about their abilities and confidence in academic environments.
Habits of Mind	Measure of the behaviors and traits associated with academic success.
Leadership	Measure of students' beliefs about their leadership development, leadership capacity, and experiences as a leader and options included the same as the academic self-concept.
Civic Engagement	Measure of the extent to which students are motivated and involved in civic, electoral, and political activities.

Participants

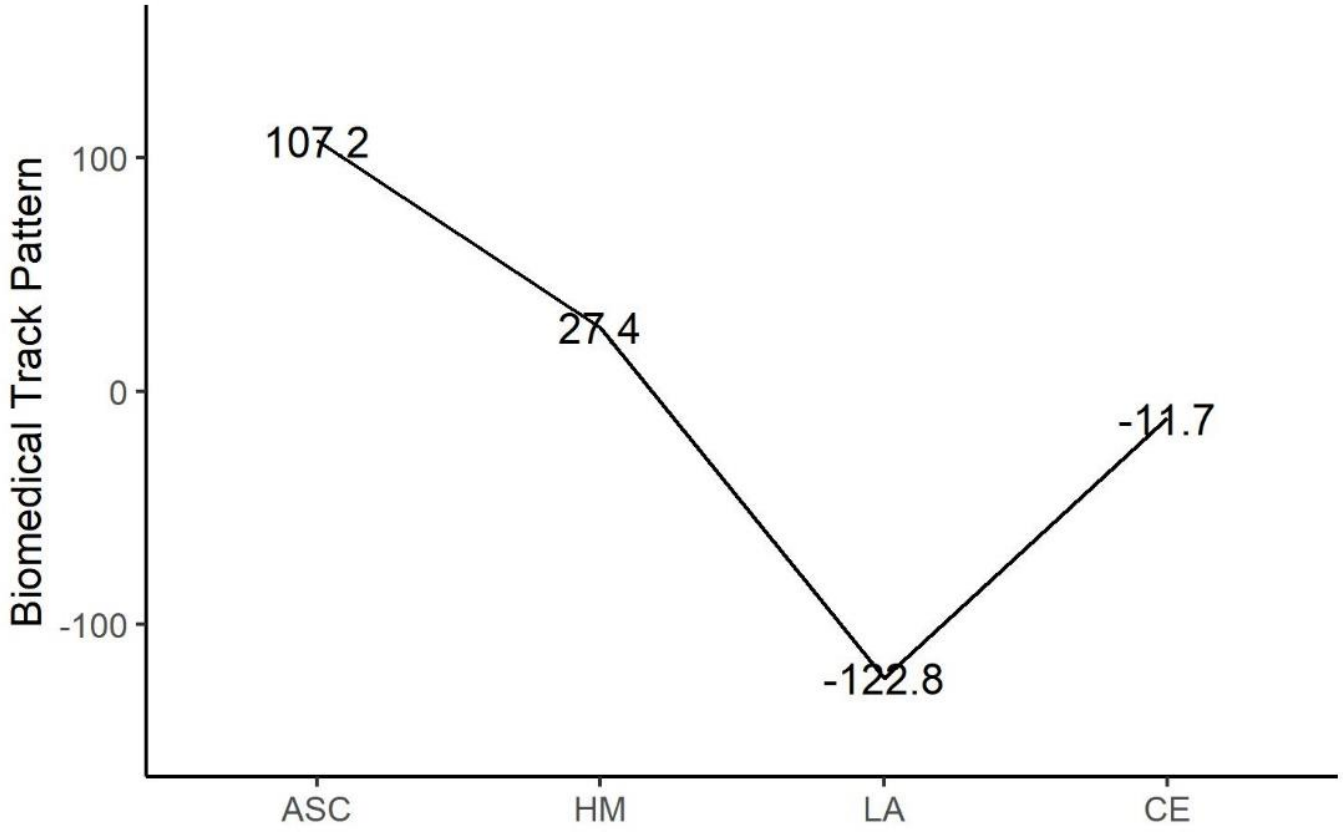
Pseudonym	Current	Track
Alma	Industry	NBT
Ilene	Master*	NBT
Adrian	Industry	NBT
Antonio	Industry	NBT
Michelle	Industry	NBT
Jackie	Industry	NBT
Hugo	Industry	NBT
Elena	Industry	NBT
Lucas	PhD	BT
Luciana	PhD**	BT
Karen	Post-Baccalaureate	BT
Sara	PhD	BT
Mariana	Master	BT
Sofia	Post-Baccalaureate	BT
Pablo	PhD	BT
Estefan	PhD	BT
Victoria	PhD	BT

Future Plans of NBT
4 applying to masters
1 applying to medical school
1 applying to physician assistant
1 in master unrelated to BT
1 applying to PhD

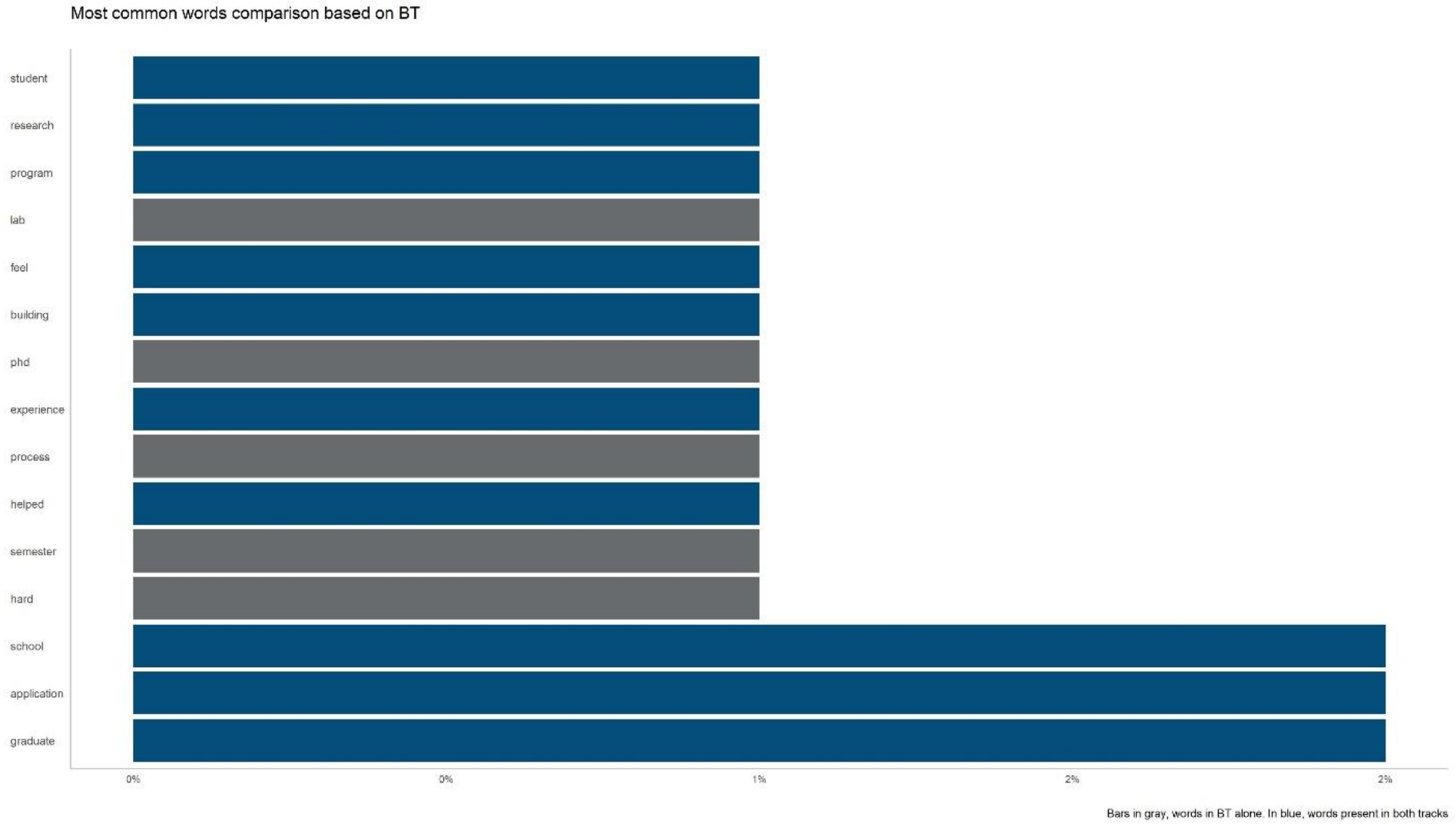
Future Plans of NBT
5 at R1 Institution
1 at R2 Institution
1 PhD at Special Focus Medical School
2 Post-Bac at Medical Research Center (plans to apply to MD-PhD Programs)

*Master's program is not related to biomedical field
**Initially interviewing programs, already accepted at several and now enrolled in PhD program
NBT: Non Biomedical-Track, BT: Biomedical-track

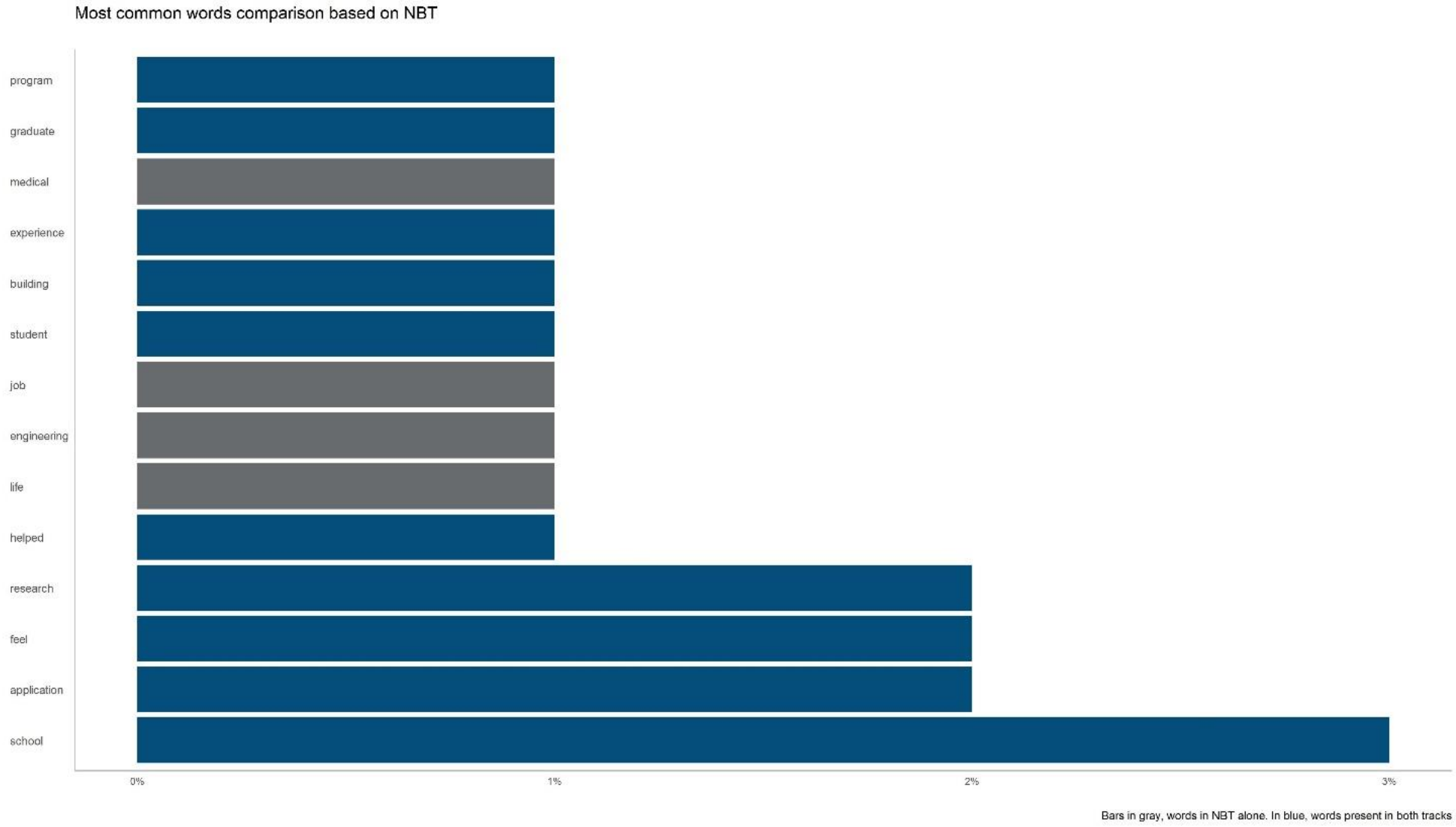
Quantitative Results: Criterion Pattern Analysis



Results: Text Pattern Analysis

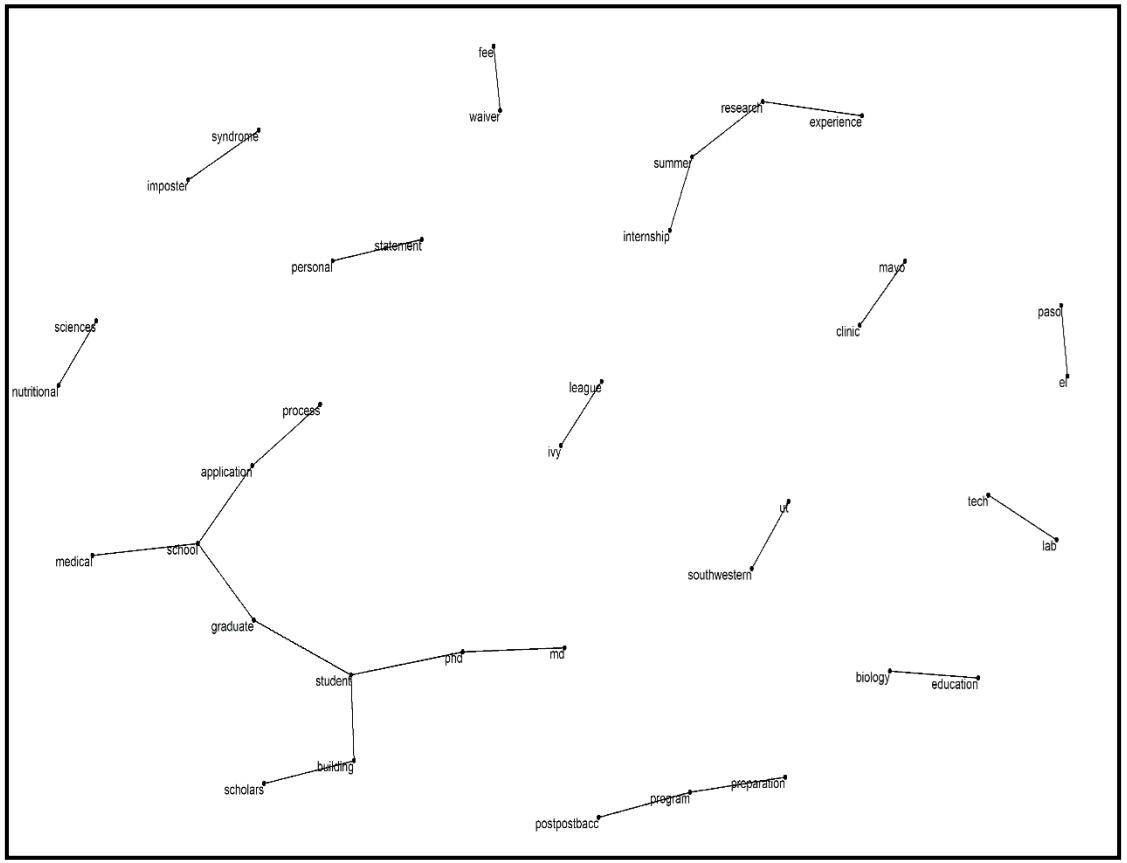


Results: Text Pattern Analysis

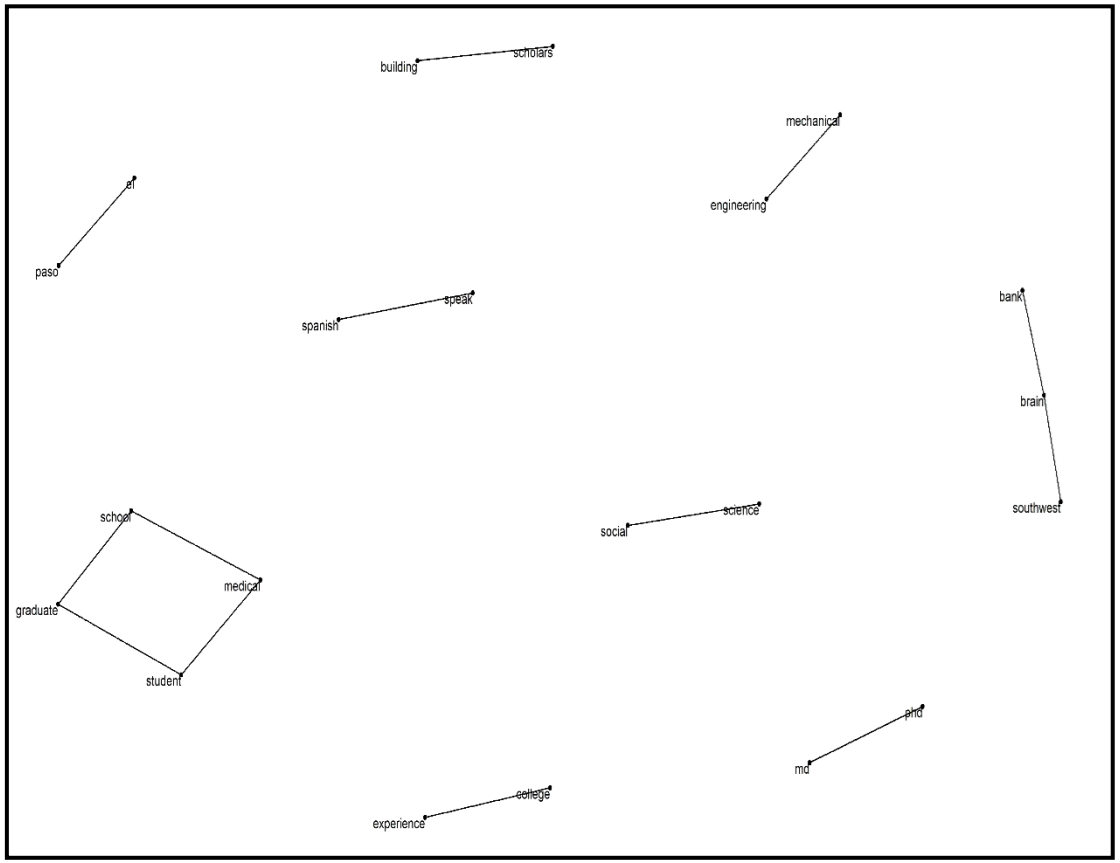


Results: Word Association Analysis

- **Biomedical Track**



- **Non-Biomedical Track**



Results: Qualitative Data

- Biomedical Track Students
  - “I think the research experience has helped me in several ways. I got a fantastic diversity fellowship that was merit-based based on the amount of **presentations and publications** and experience that I've gotten” (Lucas)
  - “I liked more detailed work and I like seeing images of the brain and I'm kind of being more hands-on with this, and that's kind of why I decided to go **more towards grad school than med school**. I thought it'd be more suitable for it what I like to do.” (Sara)

Results: Qualitative Data

- Non-Biomedical Track Students
  - “**I wasn't really sure** what aspect of research I wanted to go into” (Jackie)
  - “I also applied to grad schools, but I decided not to do grad school because of **my financial situation** and the financial situation in my family, I could not afford grad school” (Hugo)
  - “So my senior year at [university], I really **didn't know** what I wanted to do once I graduated” (Elena)

Discussion and Conclusion

- Biomedical track students value the research entire experience
- Biomedical track students emphasize academics and research preparation
- Non-Biomedical track students tend to emphasize gaining leadership experience and engagement with community
- Non-Biomedical track students needed more aid in choosing a research path

- **Reflections:**
  - Is this due to preference or a feeling that leadership and community engagement do not have a role in biomedical research?
  - How can we develop research career aspirations?

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THANK YOU!