

**Summer Opportunities in Anatomy Research (SOAR)**  
American Association for Anatomy Innovations Program

**Project Update: October 2, 2019**

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## Overview

The Summer Opportunities in Anatomy Research (SOAR) program is 10-week internship program that offers hands-on experiences in anatomical research, education, and outreach to undergraduate students. SOAR specifically targets undergraduate populations that do not share a campus with a graduate anatomy program or have similar opportunities at their home institutions. The mission of SOAR is to recruit the next generation of anatomists from diverse and underrepresented groups, with a focus on retaining those students through individual mentorship and early career preparation.

The 2019 SOAR program ran from May 15-July 19 and culminated in research poster presentations by SOAR interns at a campus-wide research appreciation day. The 2019 interns will submit their research abstracts for the annual meeting of AAA at EB 2020.

The 2019 and 2020 SOAR programs are funded by the American Association for Anatomy's Innovations Program. The SOAR faculty and students wish to express their sincere appreciation for the AAA's support for the internship program, and the association's commitment to diversity and inclusion within the anatomical sciences.

## 2019 Application Cycle

### Application and Selection Process

The online application was open January 15-March 1, 2019. The program was advertised through the AAA Anatomy Connected forum, social media postings, and direct emails to undergraduate faculty and advisors.

A letters of recommendation was requested for finalists by March 13. The selection committee (Drs. Kesterke, Menegaz, Maddux, and Muchlinski) met on March 15 to review the materials. Applicants were notified of their status by March 22.

### **Total applicants: 87**

Application criteria: 18+ years old, 3.0 undergraduate GPA, US citizen (for UNTHSC hiring logistics), undergraduate enrollment in Fall 2019.

See [Appendix 1, 2019 SOAR Application](#)

## **Finalists: 17**

The applicant pool was narrowed down to a selection of finalists (20% of total applicants) based on their indicated interest in a research-based graduate program and the anatomical sciences. SOAR is specifically designed as a pre-graduate school program and includes workshops on selecting and applying to graduate school, careers in the anatomical sciences, etc. For non-finalist students not interested in research-based graduate programs, we directed them towards the other pre-medical/allied health sciences programs run on the UNTHSC campus.

See [Appendix 2, Finalist Demographics](#)

## **Accepted interns: 3**

Our interns this year were ultimately chosen through their personal statements and their letters of recommendation. They showed specific interests in anatomical research and education, and identified anatomy-based research topics that they were interested in learning about. These topics ranged from human evolution to neuroanatomy/physiology. We heard from their letter writers that these were motivated, bright students who were excellent candidates for advanced graduate programs. For one student, the faculty letter writer wrote that the applicant is passionate about anatomy and intellectually curious, but was unsure if grad school is for her. After we accepted that student, her faculty member sent a kind note that read: "SOAR might make her into a researcher!" We heard from the other two faculty letter writers that their students are first-generation college students who showed promise as researchers but who would be unable to participate in research opportunities without financial support or a stipend.

### 2019 SOAR Intern Demographics (n=3)

Gender: 3 female

Ethnicity: 2 white (non-Hispanic), 1 American Indian (Native American)

Parental Education Level: 2 students have parents with high school diplomas, 1 student has parents with no high school diplomas

## 2019 SOAR Program

### Intern Profiles

Jenessa Bushman is an undergraduate nursing student at Salt Lake Community College in Utah (anticipated graduation date: Spring 2021). Jenessa is a first-generation college student, and is currently applying to graduate programs in nursing and serving as a gross anatomy teaching assistant and prosector. About her experience in the SOAR program, Jenessa writes: “I learned a lot about myself and have gained clarity on my career path. I am very grateful that I was able to network and gain mentors that are willing to assist wherever my path may lead.”



Amber Cooper is an undergraduate biological anthropology student at the University of Arkansas in Fayetteville (anticipated graduate date: Spring 2022). Amber is a first-generation college student, and is currently a research assistant in the laboratory of Dr. Claire Terhune at her home institution. She is interested in pursuing doctoral-level research in human evolutionary anatomy. Amber’s experience in SOAR greatly improved her self-confidence. She writes that her most valuable experience in the program was gaining the “ability to ask questions without fear of feeling stupid.”



Holly LaRocque is an undergraduate biology student at Humboldt State University in California (anticipated graduation date: Fall 2021). Holly is a first-generation college student and is a non-traditional student who enrolled in college 14 years after high school graduation. She is currently completing a year-long research practicum focused on brain cancer at her home institution, and is excited to apply the quantitative histology skills she learned as a SOAR intern. Holly is interested in graduate training opportunities that will allow her to combine her passion for teaching anatomy with research in neurophysiology. She writes: “Any doubts I had about pursuing research were squashed during my internship. I cannot imagine not pursuing a PhD and a career that doesn't include both teaching and research. I also feel like I am much more prepared for applying to graduate programs with the guidance I received in the SOAR program.”



We were fortunate this year to have two additional interns working with the SOAR cohort. Avery Boley (Texas A&M Commerce University, UNTHSC SMART Program<sup>1</sup>) collaborated with Holly LaRocque to study different aspects of masticatory muscle plasticity. Jenessa Bushman served as a research project mentor to high school student

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<sup>1</sup>Summer Multicultural Advancement Research Training, funded by the National Heart, Lung, And Blood Institute of the National Institutes of Health under Award Number R25HL007786 to Harlan Jones, Ph.D.

Haleema Williams (Texas Academy of Biomedical Sciences, HSC Explore Internship Program).



*Left to right: Avery Boley (SMART), Jenessa Bushman (SOAR), Amber Cooper (SOAR), Haleema Williams (HSC Explore), Holly LaRocque (SOAR)*

## SOAR Activities

In addition to completing mentor-guided research projects, the SOAR program included:

- A campus orientation hosted by the UNTHSC Center for Diversity and International Programming (CDIP). UNTHSC hosted 5 undergraduate research internship programs (in addition to other pre-professional internship programs) during summer 2019. The SOAR students were housed with other undergraduate interns, fostering a sense of community amongst the students.
- A Summer Welcome Lunch hosted by the Center for Anatomical Sciences to welcome the SOAR interns and new graduate students.
- A seminar series in biomedical sciences research hosted by CDIP.
- A trip to Texas A&M Health Science Center in Dallas, hosted by AAA members Drs. Shaun Logan and Matthew Kesterke. The SOAR interns attended a neuroscience lecture by Dr. Logan, toured the anatomy facilities, and discussed careers in the anatomical sciences.
- A tour of the UNTHSC Human Vascular Physiology lab, where Dr. Steven Romero and lab members gave demonstrations of the research techniques used to study physiology in human volunteers.
- The Texas Academy for the Biomedical Sciences (TABS) Summer Bridge Program, a 4-day program for new 9<sup>th</sup> grade students at the TABS high school. SOAR and UNTHSC students led workshops in gross anatomy, forensic osteology, a neuromuscular reflex clinic, a “scrub-in” clinic teaching aseptic technique, and a student-run panel on careers in the biomedical sciences.
- Workshops in scientific communication, including lightning (5 minute) talks on their research project and practice presentations on the research posters for the AAA annual meeting.

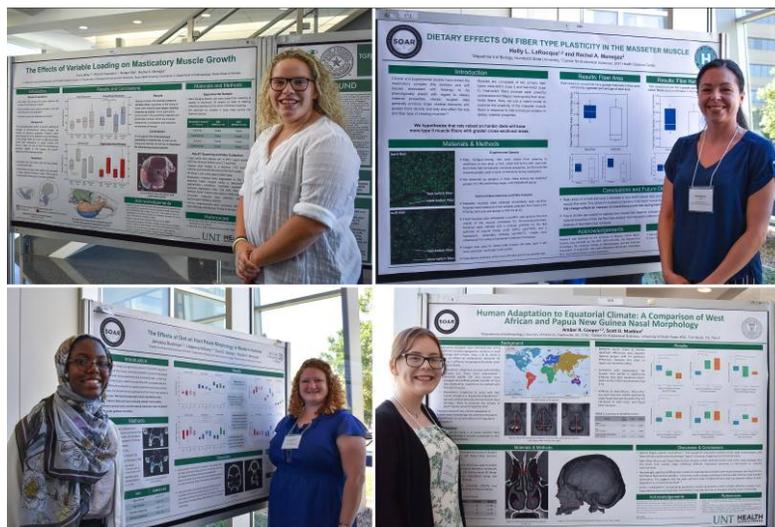


*SOAR interns with Dr. Matthew Kesterke (far left) and Dr. Shaun Logan (far right).*

- A seminar on *Homo naledi* research in South Africa by Dr. Becca Peixotto (Perot Museum), followed by a trip to the Perot's Rising Star exhibit in Dallas.
- Professional Development activities:
  - A seminar on Ph.D. careers by Dr. Natalie Lundsteen (University of Texas Southwestern Medical Center).
  - A "Careers in Anatomy" seminar by Dr. Rustin Reeves (UNTHSC).
  - A workshop on preparing a curriculum vitae or resume.
  - A workshop on applying to graduate school, led by SOAR faculty and the UNTHSC Graduate School of Biomedical Sciences admissions office.
- Gross anatomy workshops:
  - An intensive (4-day), prosection-based anatomy workshop on functional anatomy of the upper limbs taught by Dr. Scott Maddux for pre-matriculation UNTHSC students.
  - A series of half-day prosection-based anatomy labs taught by Center for Anatomical Sciences faculty. Topics included head and neck anatomy, cardiopulmonary anatomy, and neuroanatomy.
- A campus-wide poster session as part of the CDIP Summer Research Internship Programs (SRIP) research appreciation day. SOAR students presented their summer research projects (see [research products](#), below).



SOAR interns and UNTHSC graduate students during the TABS Summer Bridge Program.



Summer interns presenting their research at the 2019 UNTHSC SRIP poster session.

## Research Products

The following posters were presented at the 2019 UNTHSC SRIP poster session:

1. Boley A, Saavedra R<sup>2</sup>, Kile R, Menegaz RA. 2019. The Effects of Variable Loading on Masticatory Muscle Growth. UNTHSC Summer Research Internship Programs Research Day. 18 July, 2019.
2. **Bushman J**, Williams H, Maddux SD, Menegaz RA. 2019. The Effects of Diet on Hard Palate Morphology in Modern Humans. UNTHSC Summer Research Internship Programs Research Day. 18 July, 2019.
3. **Cooper A** and SD Maddux. 2019. Human Adaptation to Equatorial Climate: a Comparison of West African and Papua New Guinea Nasal Morphology. UNTHSC Summer Research Internship Programs Research Day. 18 July, 2019.
4. **LaRocque HL** and Menegaz RA. 2019. Dietary Effects on Fiber Type Plasticity in the Masseter Muscle. UNTHSC Summer Research Internship Programs Research Day. 18 July, 2019.

The following abstract has been submitted for the 2020 annual meeting of the Society for Comparative and Integrative Biology:

1. Menegaz RA, Rossiter JA, **LaRocque HL**, Boley A, Kile R, Saavedra R<sup>2</sup>. Diet-Related Plasticity in Rodent Masticatory Muscles. *Journal of Integrative and Comparative Biology* 60(S1), submitted.

The following abstracts will be submitted for the 2020 annual meeting of the American Association for Anatomy at Experimental Biology:

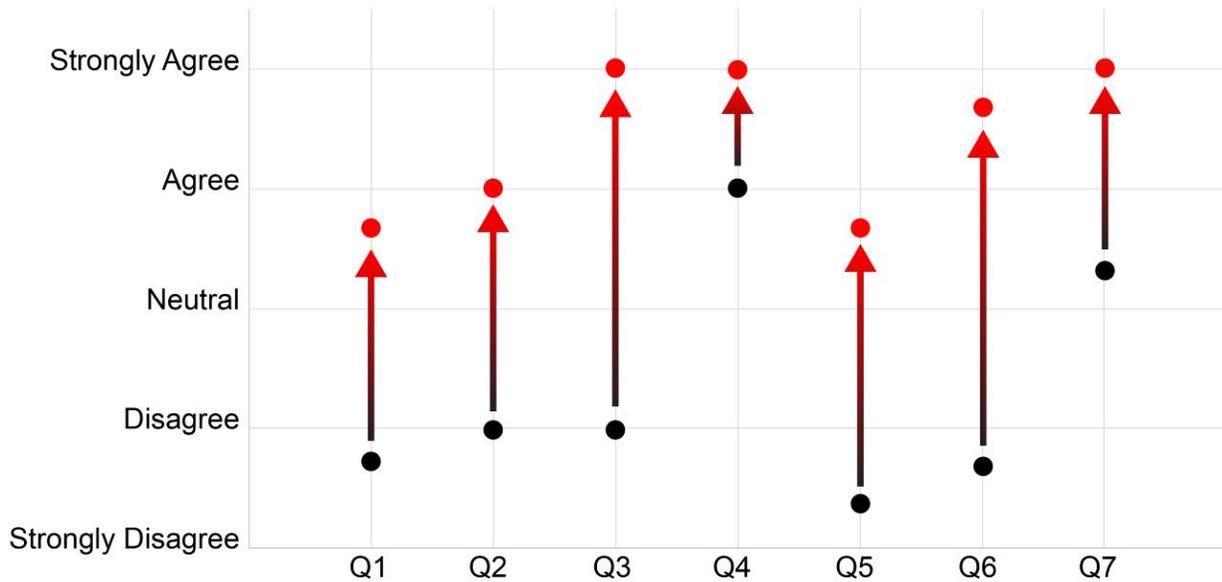
1. **Bushman J**, Williams H, Maddux SD, Menegaz RA. 2019. The Effects of Diet on Hard Palate Morphology in Modern Humans. *Federation of American Societies for Experimental Biology (FASEB) Journal* 34(S1), in preparation.
2. **Cooper A** and SD Maddux. 2019. Human Adaptation to Equatorial Climate: a Comparison of West African and Papua New Guinea Nasal Morphology. *Federation of American Societies for Experimental Biology (FASEB) Journal* 34(S1), in preparation.
3. **LaRocque HL** and Menegaz RA. 2019. Dietary Effects on Fiber Type Plasticity in the Masseter Muscle. *Federation of American Societies for Experimental Biology (FASEB) Journal* 34(S1), in preparation.

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<sup>2</sup> 2018 SOAR intern

## 2019 Internship Survey Results

Selected pre- and post-internship survey results from the 2019 SOAR program. Black dots represent pre-internship averages (n=3), red dots represent post-internship answer averages (n=3).



- Q1** I am confident in my ability to write a research proposal.
- Q2** I am confident in my ability to write a scientific abstract describing research that I have participated in.
- Q3** I am confident in my ability to design a research poster.
- Q4** I am confident in my ability to deliver oral presentations (posters or podium) of research that I have participated in.
- Q5** I am confident in my ability to write up research for publication in a peer-reviewed scientific journal.
- Q6** I am confident in my ability to prepare an application to graduate school.
- Q7** I am confident in my ability to succeed in graduate school, should I decide to attend.

## 2019 SOAR Budget

<b>Budget to offset costs of student living and housing</b>	<b>2019 Estimate for 3 Students</b>	<b>2019 Expenditures to Date</b>
Student stipend	\$ 12,000.00	\$ 12,000.00
Student housing	\$ 9,650.00	\$ 6,534.00
Student parking	\$ 90.00	\$ 52.00
<b><i>Total student living and housing costs</i></b>	<b>\$ 21,740.40</b>	<b>\$ 18,812.92</b>
<b>Budget to offset costs of research in UNTHSC labs</b>	<b>2019 Estimate for 3 Students</b>	<b>2019 Expenditures to Date</b>
Research costs (lab consumables, etc.)	\$ 900.00	\$ 100.59
<b><i>Total research costs</i></b>	<b>\$ 900.00</b>	<b>\$ 100.59</b>
<b>Budget for conference travel to present internship research</b>	<b>2019 Estimate for 3 Students</b>	<b>2019 Expenditures to Date</b>
AAA annual meeting travel	\$ 900.00	\$ -
AAA annual meeting housing	\$ 1,320.00	\$ -
AAA annual meeting student membership and registration	\$ 135.00	\$ 157.50
<b><i>Total conference travel costs</i></b>	<b>\$ 2,355.00</b>	<b>\$ 157.50</b>
<b>Total budget for one summer of SOAR</b>	<b>2019 Estimate</b>	<b>2019 Expenditures to Date</b>
Total budget per student	\$ 8,331.67	\$ 6,281.36
<b><i>Total summer budget for 3 students</i></b>	<b>\$ 24,995.00</b>	<b>\$ 18,844.09</b>
<b>Total amount requested for 2019 and 2020 SOAR Programs</b>	<b>2019-2020 Estimate</b>	
Total budget for 2019 and 2020 (3 students/summer)	\$ 49,990.00	
<b><i>Total requested from AAA Innovations Program</i></b>	<b>\$ 49,990.00</b>	

We budgeted **\$22,775.00** for the May-July 2019 period. Current expenditures for that period are **\$18,844.09**, in large part due to cost-sharing of student housing with the UNTHSC Center for Diversity and International Programming (CDIP). We predict that costs for conference travel for the 2019 interns in April 2020 may exceed the projected budget, due to high travel costs from smaller regional airports.

## **Future Directions**

### **2020 SOAR Program**

The application for the 2020 SOAR program will be open from January 15 – March 1, 2020. We request AAA's assistance in advertising the program through social media again this year, as the association's help in 2019 was invaluable. We plan to accept 3-4 interns for the 2020 program (May 13 – July 17), contingent upon funding, and to add an additional 1-2 faculty research mentors to our current roster. Additionally, based upon feedback from the 2019 cohort, we will add additional workshops on scientific writing, specifically covering conference abstracts and poster design. Finally, we are working with the UNTHSC Graduate School of Biomedical Sciences and Center for Diversity and International Programming to increase SOAR's visibility on campus and to develop promotional materials for the internship program.

### **Survey of Anatomy Graduate Programs**

One goal of the SOAR program is to improve the resources available to anatomy trainees by updating the current AAA resource on graduate programs. SOAR faculty and graduate students in the UNTHSC Center for Anatomical Sciences are currently developing a survey on anatomy graduate programs to be distributed and promoted at the 2020 annual meeting of AAA. This survey will include the following topics:

- Graduate program title
- Degrees offered
- Contact name and email for the director of graduate studies
- Keywords for the program focus, including the education focus (undergraduate, graduate, professional) and research focus (basic science, clinical, education) of the program faculty
- Names and contact information for faculty who are currently accepting students
- The program's website URL

This information will be used to update the AAA website and make it more easily searchable by potential students.

### **2021 Panel: Applying to Graduate School**

Each summer, the SOAR program includes a workshop on applying to graduate school. We are compiling a list of questions asked by the interns and using these as a framework for an annual meeting session proposal for AAA 2021. We will invite 4-5 graduate program directors to participate in a panel on anatomy graduate training opportunities and hope these panelists will represent a broad range of teaching and

research foci. This content can potentially be adapted into a written resource for the AAA website.

### **Careers in Anatomy**

During the 2019 SOAR program, we debuted a new speaker series entitled “Careers in Anatomy” intended to highlight the diverse range of backgrounds, career training, and research/education foci seen amongst AAA members. The 2019 series included a seminar by Rustin Reeves, Ph.D. (UNTHSC) and informal presentations by Matthew Kesterke, Ph.D., and Shaun Logan, Ph.D. (TAMHSC). SOAR faculty and graduate students in the UNTHSC Center for Anatomical Sciences are currently developing an interview-style survey that can be distributed to faculty, in order to facilitate faculty participation and student accessibility.

# Appendix 1: 2019 SOAR Application

## Summer Opportunities in Anatomy Research (SOAR)

Please complete this form to apply for the Summer 2019 UNTHSC SOAR program for undergraduate students.

Please note that the deadline to submit this application is 11:59 PM (CDT) on March 1, 2019.

\* Required

### Student Contact Information

1. First Name: \*

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2. Middle Name/Initial

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3. Last Name: \*

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4. E-mail Address: \*

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### Education Information

5. Undergraduate Institution: \*

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6. What type of degree are you currently seeking?

*Mark only one oval.*

Bachelor of Arts (BA)

Bachelor of Science (BS)

Other: \_\_\_\_\_

**7. Degree Major(s): \***

*Check all that apply.*

- Anthropology
- Biochemistry
- Biology
- Chemistry
- Kinesiology
- Microbiology
- Pre-Medicine/Health Science Professions
- Other: \_\_\_\_\_

**8. Degree Minor(s):**

*Check all that apply.*

- Anthropology
- Biochemistry
- Biology
- Chemistry
- Kinesiology
- Microbiology
- Pre-Medicine/Health Science Professions
- Other: \_\_\_\_\_

**9. Anticipated Graduation Semester: \***

*Mark only one oval.*

- Spring
- Summer
- Fall

**10. Anticipated Graduation Year: \***

*Mark only one oval.*

- 2019
- 2020
- 2021
- 2022
- 2023

**Research and Career Interests**

**11. Which of the following career option(s) are you interested in pursuing after graduation? Choose as many as apply. \***

*Check all that apply.*

- Graduate school (masters or doctoral degree)
- Professional school (medical or allied health degree)
- Career in academia (research)
- Career in academia (teaching)
- Career in industry or non-profit
- Other: \_\_\_\_\_

**12. Which of the following career field(s) are you interested in pursuing after graduation? Choose as many as apply.**

*Check all that apply.*

- Anatomical Sciences
- Anthropology
- Biological Sciences
- Biomedical Sciences
- Dentistry
- Medicine
- Nursing
- Pharmacy Studies
- Physician Assistant Studies
- Physical/Occupational Therapy
- Veterinary Medicine
- Other: \_\_\_\_\_

**13. Which of the following research topics are you interested in? Choose as many as apply. \***

*Check all that apply.*

- Functional morphology
- Gross anatomy
- Growth and ontogeny
- Histology
- Hominin evolution
- Human anatomical variation
- Human development
- Human disease
- Musculoskeletal biology
- Primate evolution
- Sensory ecology
- Other: \_\_\_\_\_

14. If you are interested in working with a specific SOAR faculty mentor(s), please indicate so below. Choose as many as apply. \*

*Check all that apply.*

- Dr. Matthew Kesterke
- Dr. Scott Maddux
- Dr. Rachel Menegaz
- Dr. Magdalena Muchlinski
- Other: \_\_\_\_\_

## Personal Statement

15. Please include a short (maximum 500 words) personal statement. How is research in the anatomical sciences related to your career goals, and how will this program help you to achieve those goals? \*

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## Demographic Data

This data will be used to identify long-term trends in SOAR applications.

16. Gender

*Mark only one oval.*

- Female
- Male
- Prefer not to specify
- Other: \_\_\_\_\_

17. Ethnic Identity

*Mark only one oval.*

- Asian or Asian American
- African, African American, or Black
- Hispanic or Latino
- White, Caucasian, Anglo, European American; not Hispanic
- American Indian or Native American
- Alaska Native
- Pacific Islander
- Prefer not to specify
- Other: \_\_\_\_\_

**18. What is the highest degree held by one or both of your parents?**

*Mark only one oval.*

- No high school diploma
- High school diploma
- Associates degree
- Bachelors degree
- Masters degree
- Doctoral degree
- Prefer not to specify

**19. How did you find out about the SOAR Program?**

*Mark only one oval.*

- Through a faculty member
- Through another student
- Through social media (e.g. Facebook, Twitter, etc.)
- Through the UNTHSC or Center for Anatomical Sciences website
- Other: \_\_\_\_\_

**Faculty Letter of Recommendation**

Please provide the contact information for a letter of recommendation from a faculty member.

Please note that we cannot accept recommendations from staff members or graduate student instructors/TAs.

**20. Faculty Name \***

\_\_\_\_\_

**21. Faculty Email Address \***

\_\_\_\_\_

**SOAR will request your letter of recommendation directly from the faculty member listed.**

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Please do not send the letter in advance.

Letters of recommendation will only be requested if deemed necessary by the SOAR committee.

**Required Materials**

Please include the following required materials with your application. You can upload them using this form, or mail them to the following physical address:

Dr. Rachel Menegaz  
Center for Anatomical Sciences  
University of North Texas Health Science Center  
3500 Camp Bowie Blvd.  
Fort Worth, Texas 76107

**22. Curriculum Vitae or Resume**

Files submitted:

**23. Current Transcript (Official or Unofficial)**

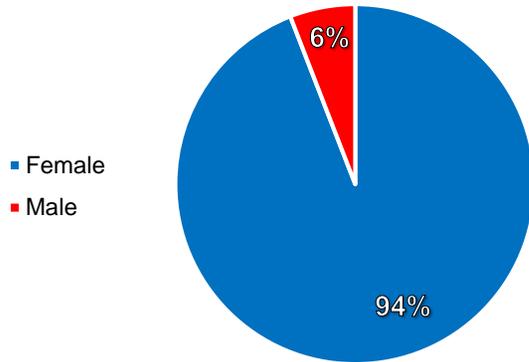
Files submitted:

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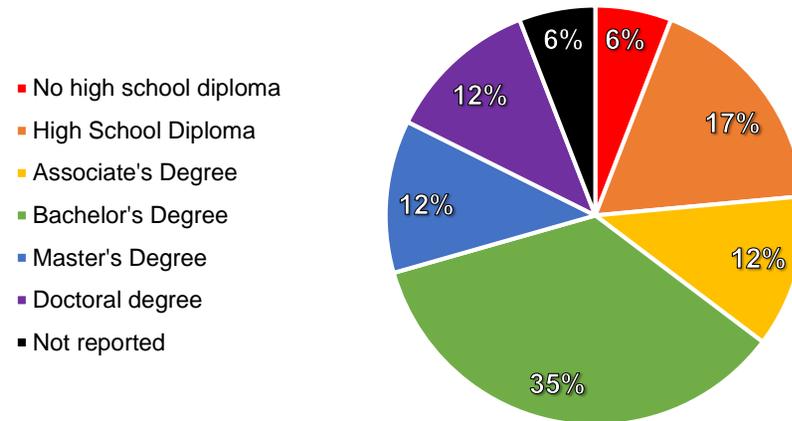
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## Appendix 2: Finalist Demographics (n=17)

Gender of Application Finalists



Highest Degree Held by Parents of Finalists



Ethnic Identity of Application Finalists

