

# Experiences in Applying to and Attending Biological Anthropology Programs Focused on Human Skeletal Biology

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**ABSTRACT:** Because of the lack of forensic anthropology degree-granting programs, forensic anthropologists have traditionally attended programs that grant general anthropology degrees while performing human skeletal biology (HSB) research. In order to examine potential changes in competition for HSB graduate programs and to generally inform the community of trends and the current state of HSB graduate programs, the authors generated an electronic survey, distributed from June 2016 to April 2017, soliciting responses from anyone with current or past experiences attending HSB graduate programs.

Among other results, respondents indicate that GPA remains an important factor for acceptance in graduate programs, with the average respondent GPA of 3.6 and all faculty respondents indicating a preferred minimum GPA at or above 3.0 (with an average faculty response of 3.3). The average combined GRE score of respondents was 312, although 56% of faculty respondents indicated that they did not have a preferred minimum GRE for applicants. Letters of recommendation and personal statements were ranked highest by faculty in degree of importance in graduate student applications. Debt accrued by degree varied greatly among individuals, but 69% of respondents had full funding for their doctorate. Notably, 90% of respondents recommended students take some time off between degrees. The results of this survey promote a general awareness of HSB graduate program environments. The information provided can be used to better prepare students in biological anthropology, including those pursuing forensic anthropology, for success in their academic journey.

**KEYWORDS:** graduate school, education, student debt, advising, forensic anthropology, biological anthropology

## Introduction

Bethard (2017) reported that of all American Board of Forensic Anthropology (ABFA)–certified individuals, approximately 78% of their dissertations focused on topics dealing with skeletal biology, bioarchaeology, or forensic anthropology, demonstrating that doctoral-level forensic anthropologists in the United States have varied backgrounds in human skeletal biology (HSB). Because of the limited number of forensic anthropology degree-granting programs, forensic anthropologists have traditionally attended broader-scoped degree programs in anthropology and gained the forensic anthropology component of their education through topical courses and interactions with advisers and mentors, while conducting research in HSB.

For individuals interested in careers in forensic anthropology with educations focusing on HSB in disciplines such as bioarchaeology, forensic anthropology, and paleoanthropology, the completion of a graduate degree has become a requirement for gainful employment. These students are faced with difficult, life-changing decisions when it comes to pursuing such a graduate degree, and many wish in retrospect (present authors included) that they had more information during that process. Faculty and advisers can provide their students with recommendations based on their experiences, but even so, they may not be aware of such things as student financial debt, completion rate, or other programs' process of ranking applicants beyond their own institution. National surveys such as the National Science Foundation's Survey of Graduate Students and Postdoctorates in Science and Engineering (National Science Foundation 2015), the National Association of Graduate and Professional Students National Doctoral Program Survey (Weibl 2001), and the Council of Graduate Schools Survey of Graduate Enrollment and Degrees (Okahana and Zhou 2017) can provide broad information about graduate education, but they fail to provide students and faculty with discipline-specific information. Anthropological disciplines focused on HSB often feel misrepresented in such large-scale surveys, as it is unclear whether their responses are being treated under the

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“anthropology” subcategory under social sciences or essentially in an “other” category under biological sciences. Finally, the American Anthropological Association (AAA) collected some information about graduate school experiences and early career placement for the various anthropological subfields (Givens & Jablonski 2000). Unfortunately, this information has not been updated in many years and is likely not representative of biological and/or forensic anthropologists, as these individuals often do not hold membership in the AAA and prefer the American Academy of Forensic Sciences (AAFS) or the American Association of Physical Anthropologists (AAPA).

The general consensus among professionals is that graduate school in HSB programs has become more competitive over the years. However, no evidence is currently available to support or refute this assertion. In order to examine potential changes in competition for HSB graduate programs and to gather general information about the trends and the current state of HSB graduate programs, the authors generated an electronic survey that was distributed from June 2016 to April 2017, soliciting participation from current and former students in HSB graduate programs, as well as faculty members in HSB graduate programs. The anonymous survey collected information about students’ experiences in applying to and attending HSB graduate programs, as well as faculty opinions regarding preferred applicant and graduate student qualities. The goals in distributing the survey results are to promote a general awareness of HSB graduate program environments and current trends in the discipline and to provide information to future students to better prepare them for success in the pursuit of their HSB careers.

## Methods

A digital survey consisting of 43 questions was generated addressing issues surrounding the application to and attendance of graduate school in biological anthropology programs that focused on training in HSB. This survey was hosted using Qualtrics survey software (Snow 2012), a digital data-collection platform. Prior to distribution, IRB approval for this survey was granted from both authors’ institutions (at the time, Western Carolina University and Mercyhurst University). This survey was distributed electronically on a number of biological and forensic anthropology listservs, as well as on social media (e.g., Facebook), and via a linked QR code at the 2017 annual meeting of the AAPA. Participation was open to any adult individual (age 18+ years) who received the survey link. The survey was not limited to U.S. respondents; however, the distribution of the survey through U.S.-based associations (which are primarily composed of U.S. members) and the focus of some of the questions (e.g., questions

regarding GRE scores) did bias the survey toward information on U.S.-specific HSB programs.

## Materials

Survey participation was open for 322 days, from June 3, 2016, to April 21, 2017. During this period 332 respondents answered at least one of the survey questions. The average time taken to complete the survey was approximately 14 minutes. The survey did not require respondents to answer all questions; instead, respondents were directed to sets of questions based on their experiences and background (as assessed by their responses). For example, individuals were only prompted to answer questions about their PhD education experiences if they answered that they had completed or were in the process of completing a PhD in HSB. Because of this, and the fact that answering any of the questions was voluntary, the number of respondents varied per question. Overall, 282 individuals answered the majority of relevant survey questions.

Based on latitude/longitude data collected from 234 respondents, most survey respondents ( $n = 219$ ) were located in the United States (including Hawaii), 9 were in Canada, 1 was in Mexico, and 15 were distributed across Africa, Europe, and Asia (Figs. 1 and 2). Note that these location data represent the current location of the respondent when taking the survey, not necessarily where they attended their graduate program. While all respondents were included in this data set, given that 89% of respondents were located in the United States and many of the questions were geared toward the U.S. academic system (e.g., use of GPA and GREs), the results of this survey pertain primarily to U.S. HSB programs. Although numerous respondents may come from the same academic programs, there is a fairly broad distribution of geographic location across the United States (Fig. 2).

Of the 332 respondents, 136 had obtained a PhD in HSB, 80 were current HSB PhD students (with or without a prior master’s degree), 41 had obtained a terminal HSB master’s degree (i.e., did not pursue a doctoral program), and 52 were current master’s students in HSB programs. Additionally, 5 respondents had been applying to graduate programs but were not yet accepted into a program, and 18 respondents stated that they had no experience with graduate programs in HSB (i.e., have not applied or attended) and thus were automatically exited from the survey.

Of the 282 individuals who completed the majority of relevant survey questions, 44% had obtained their PhD, 37% had obtained a master’s degree, 18% had obtained a bachelor’s degree, and 1% had obtained an MD. Current employment is presented in Table 1. Of those who had obtained a PhD, 83/123 (67.5%) were faculty members at the time of the survey.



FIG. 1—World map illustrating approximate geographic location of respondents ( $n=234$ ) (generated using *copypastemap.com*).

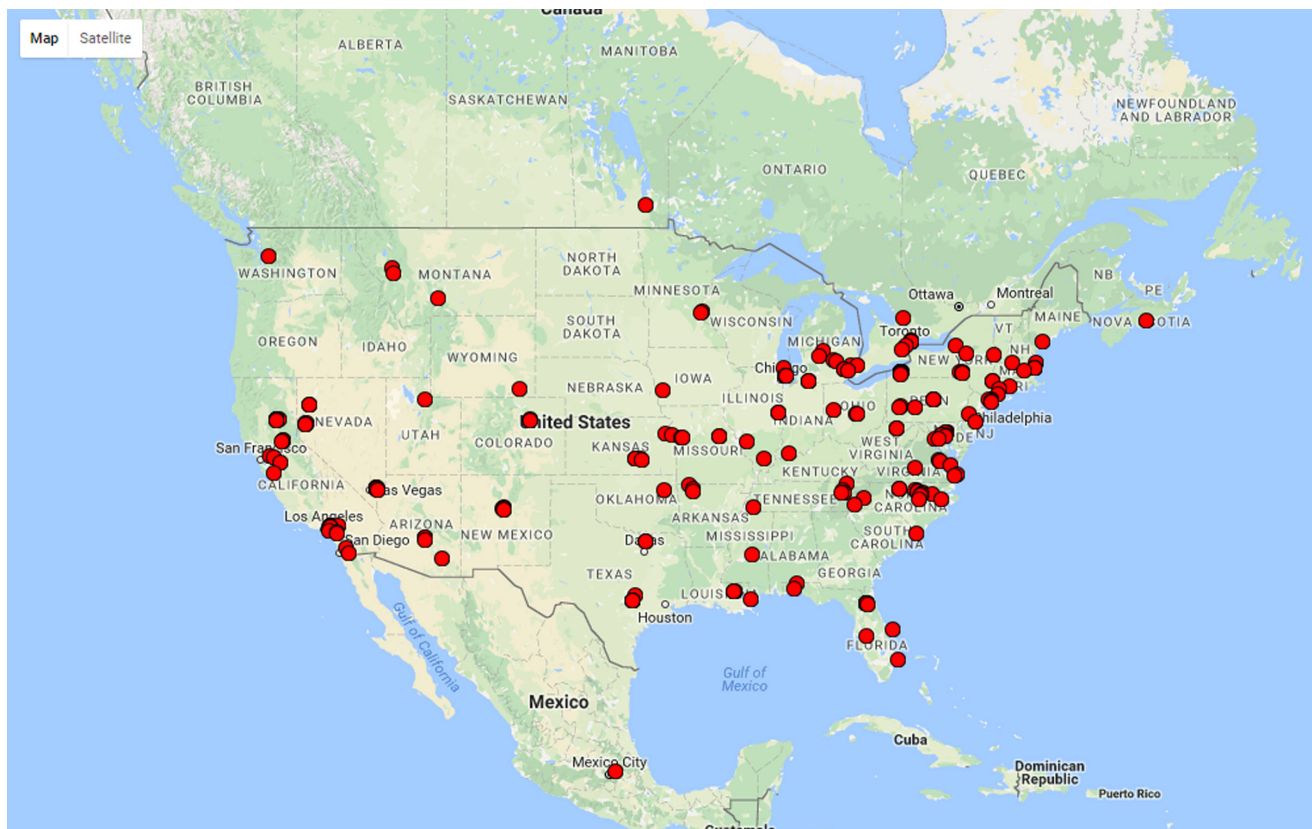


FIG. 2—Distribution of respondents in the continental United States, Canada, and Mexico ( $n=219$ ) (generated using *copypastemap.com*).



TABLE 1—*Reported Current Employment of Respondents.*

Current Employment	Number
Student (to include fellowships, TA, GA, RA, etc.)	100
Faculty at college/university	89
Other position related to your discipline	34
Employed in position unrelated to your discipline	15
Unemployed	10
Postdoc at college/university	9
Research assistant	8
Defense POW/MIA Accounting Agency	7
Medical examiner's office	6
Museum position	4
Total	282

## Results

### Undergraduate Education

**Undergraduate curricula.** The first item of interest was the undergraduate educational background of students who pursued (past or present) graduate degrees in HSB. The assumption was that most students who pursued an HSB graduate education were anthropology majors at the undergraduate level who had been exposed to a variety of biological anthropology courses. The results indicate that most individuals received an undergraduate degree from a “four-field” anthropology program (59% of 283 respondents). This was followed by degrees in biological/physical anthropology (15%), biology/zoology (7%), archaeology (5%), and forensic anthropology (5%). Given that degrees at different institutions have various requirements and students may have pursued biological anthropology courses as electives, respondents were also asked whether they had taken various anthropology, science, and mathematics courses, as well as their participation in relevant extracurricular activities. Table 2 provides percentages for how many respondents completed various courses during their undergraduate education. Table 3 provides percentages for related extracurricular experiences students had during their undergraduate

TABLE 2—*Undergraduate Courses Completed Prior to Applying to HSB Graduate Programs.*

Courses	Percent with These Experiences (N=282)
Introduction to biological anthropology	88
A minimum of two cultural anthropology courses	73
Human osteology	71
A minimum of two biology courses	65
Introduction to forensic anthropology	53
Calculus	44
A minimum of two chemistry courses	39
Human anatomy	35
A minimum of two statistics courses	28
Vertebrate osteology/comparative anatomy	23
A minimum of two physics courses	19

TABLE 3—*Extracurricular Experiences Gained Prior to Applying to HSB Graduate Programs.*

Extracurricular Experience	Percent with These Experiences (N=282)
Gained experience working in a laboratory	59
Attended a field school	55
Conducted their own research project	53
Assisted with faculty member's research	40
External internship related to discipline	26
Acted as teaching assistant for a related course	22
Presented research at a regional meeting	22
Attended summer short course related to discipline	18
Presented research at national meeting	15
Coauthored a published manuscript	7

education. Given that most respondents successfully entered into an HSB graduate program, these lists of courses and extracurricular experiences are biased and thus may indirectly reflect some of the prerequisites desired by HSB graduate programs (see Discussion for further note on survey bias).

**Grades and examination scores.** Respondents' average undergraduate GPA was 3.6 (SD=0.4) regardless of their highest degree obtained. For the GRE score, 155 respondents provided their combined verbal and quantitative scores. Scores provided in the previous format (out of a total possible score of 1400) were converted to the new format following the GRE concordance information on the ETS.org website. The average combined GRE score was 312 (SD=11.0), with a minimum of 274 and maximum of 336 as reported by respondents (note that a 300 in the new GRE system is equivalent to a 1000 in the previous system). When analyzed by highest degree obtained, those with a PhD had an average GRE score of 314 (SD=9.2), those with a master's degree had an average GRE score of 310 (SD=13.0), and those with a bachelor's degree had an average GRE score of 312 (SD=10.7). A smaller number of respondents ( $n=109$ ) provided individual verbal and quantitative GRE scores. The average verbal GRE score was 161 (SD=6.6) and average quantitative GRE score was 153 (SD=7.0). Using two sample t-tests ( $\alpha=0.05$ ), significant differences in total GRE score were found between all groups of individuals when separated by highest degree obtained, although there is a high degree of overlap and those with a bachelor's degree had higher scores on average than those with a master's degree.

**Debt.** When asked about financial debt resulting from undergraduate education, 48% of respondents ( $N=283$ ) did not accrue any debt obtaining their undergraduate degree. Amount of debt was scored categorically based on ranges of \$10,000 up to \$50,000, and then by every \$25,000, so calculating a true average is not possible. Data were collected in this

manner, as the authors thought it was unlikely that individuals would remember exact amounts of debt but might be comfortable estimating their debt using these ranges. Of those who did accrue debt obtaining their undergraduate education, the amount of debt varied greatly (Fig. 3).

**Applying to graduate programs.** Of the 283 respondents, 83% reported getting accepted into a graduate program the first year that they applied, with 11% accepted after the second year and 4% after the third year. One individual was accepted the fourth year of applications, and four individuals reported that they have not yet been accepted into a program. Keep in mind that the survey is biased toward individuals who continued on into a HSB graduate program; individuals not accepted into graduate programs may have pursued other careers and were not exposed to the survey. Because of this bias, the acceptance rates are likely inflated. During the application process, 64% of respondents applied to four or more schools in a single application year (Fig. 4). Approximately 24% of respondents were accepted into *all* the programs they applied to, while 55% of individuals were accepted into 50% or less of the programs to which they applied.

When asked for their reason for pursuing a graduate degree, 50% of respondents said it was because they wanted to pursue a career in academia, 36% said it was because they wanted to obtain a job in an applied discipline, and 9% said it was because they “enjoyed school and did well in it, so it seemed like a good next step” (5% reported “other”).

**Taking time off between degrees.** Of the 283 survey respondents, 63% indicated that they took some time off either between their undergraduate and graduate degree or between graduate degrees. Some of the top reasons for taking time off included improving applications and gaining relative experiences in the discipline, figuring out what they wanted to

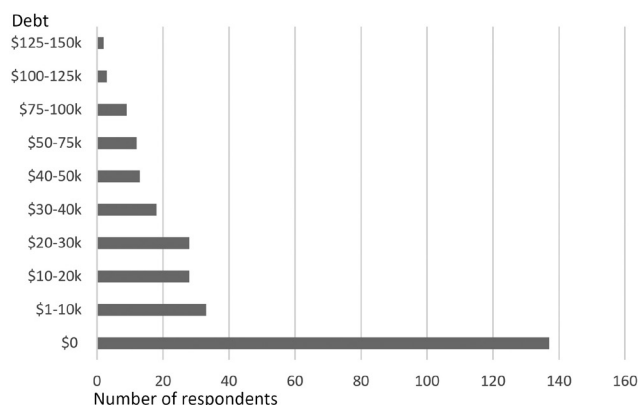


FIG. 3—Frequency distribution of reported debt accrued during undergraduate education ( $n = 283$ ).

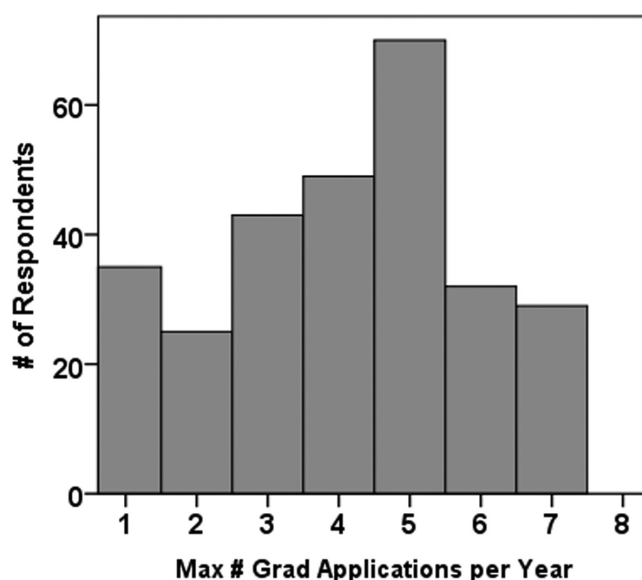


FIG. 4—Distribution of number of HSB graduate applications submitted in a single year.

do, earning money, and preventing burnout. Other responses included gaining life experiences and focusing on family. In total, over 90% of respondents, including those who did not take any time off between degrees, recommended taking time off between degrees; however, many provided the caveat that it was important to stay active in their discipline during any hiatus.

## Master's Education

**Program characteristics.** The year in which respondents began their HSB master's program ranged from 1975 to 2016, although heavily biased toward more recent years (Fig. 5). GPA by year of acceptance into master's program is presented in Figure 6. Of the 187 respondents currently or formerly in a HSB master's program, 61% were in Master of Arts (MA) programs and 39% were in Master of Science (MS) programs. Program specialties included forensic anthropology (35%), biological/physical anthropology (27%), bioarchaeology (17%), and “four-field” anthropology (16%).

Respondents were asked how many students were accepted into their master's program the same year as them, but to only include those students with a HSB focus (i.e., to not include cultural anthropology students if in a general anthropology program). Responses varied from 1 to 60 individuals accepted in a given year, although the majority (51%) indicated that their cohort consisted of five or fewer individuals (Fig. 7). (Note that the individual who reported a cohort of 60 students noted that he or she was from the United Kingdom and was specific that his or her cohort was composed of

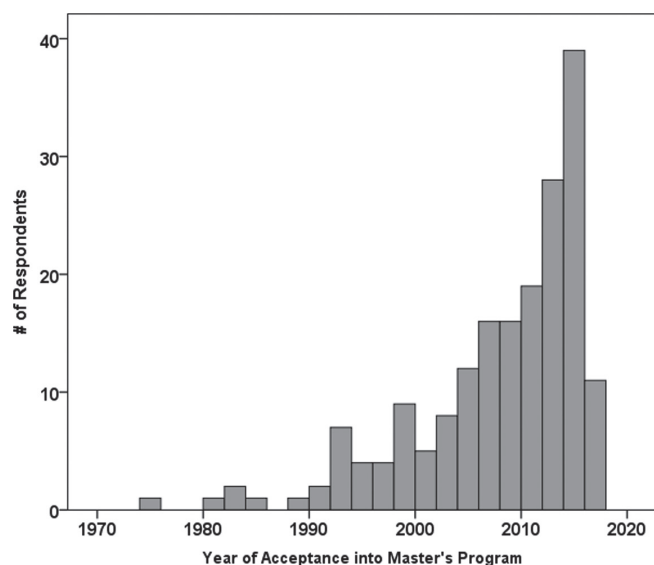


FIG. 5—Year of acceptance into HSB master's program.

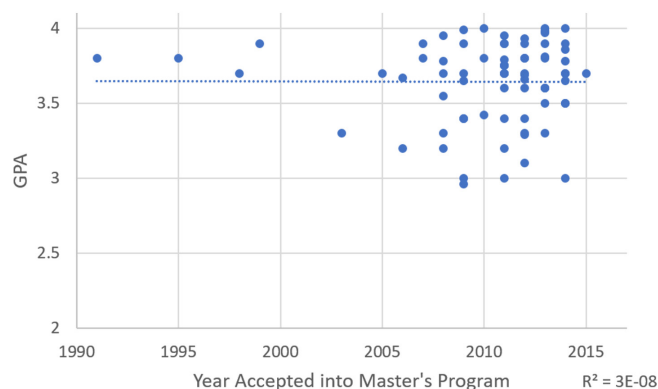


FIG. 6—GPA by year accepted into HSB master's program.

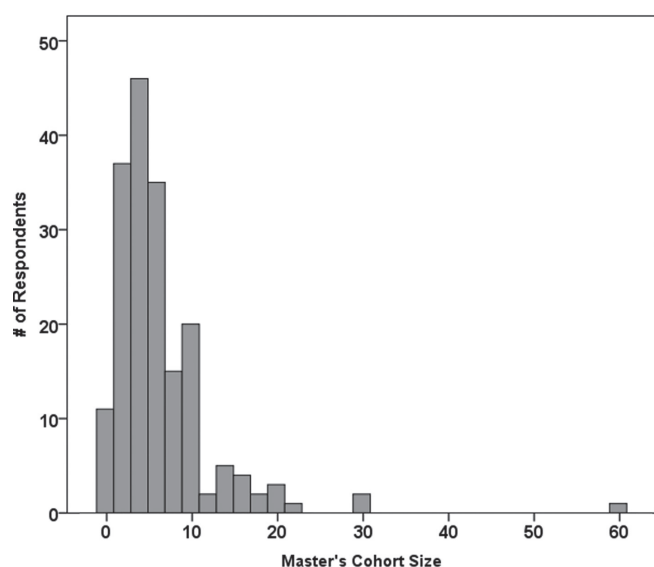


FIG. 7—Master's program cohort size.

approximately 30 students for human osteology and 30 students for paleopathology/forensic anthropology; thus, this value is not an error.)

**Program completion.** Of those who listed a graduation date of 2017 or earlier, the average time for completion of a master's degree was 2.5 years ( $SD = 1.09$ ), with a minimum of one year and maximum of seven years. Those who had not yet graduated ( $n = 36$ ) estimated that it would take them a total of 2.3 ( $SD = 0.48$ ) years to complete their degree. There was not a statistically significant difference between individuals who took time off in their studies and those who continued straight through in the time to completion, regardless of whether the analyses included individuals not yet finished (ANOVA results  $p > 0.5$ ). As part of the degree, 84% report having to complete a traditional thesis for graduation, while 12% had or have a thesis in the form of a publishable paper, and 4% report not having a thesis requirement.

**Debt.** When current and former HSB master's students ( $n = 187$ ) were asked about their funding during their master's education, 33% reported that they had full funding for their master's degree (tuition plus stipend), 3% had full tuition only, 18% had funding that covered partial tuition, 13% received funding that was only a stipend (no tuition covered), and 34% received no funding. Of the respondents who successfully completed a master's degree, 28.5% reported accruing no debt. Of those who did report accruing debt, the average debt (calculated using median values of the ranges) was \$28,398, with a wide distribution in debt ranges (Fig. 8).

## Doctoral Education

**Program characteristics.** Of the 195 respondents who previously completed or were currently in PhD programs

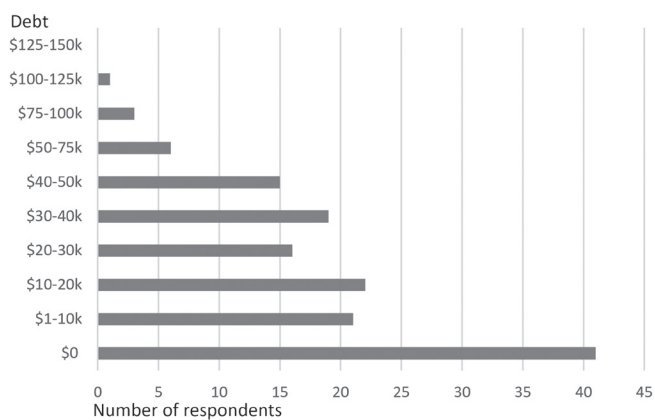


FIG. 8—Frequency distribution of debt accrued during HSB master's program ( $n = 144$ ). Note that these values only include those who completed the degree and do not include debt accrued by current master's students.

focusing on HSB, the year in which respondents began their doctoral program ranged from 1966 to 2016, again skewed toward the more recent (Fig. 9). GPA by year of acceptance into PhD program is presented in Figure 10. When asked what field best described the focus of their doctoral degree, 45% said biological/physical anthropology, 25% said bioarchaeology, 12% said forensic anthropology, 7.6% said “four-field” anthropology, 3% said paleoanthropology, and 3% said anatomy (3% “other”).

Of those previously or currently in a PhD program, 25% reported attending graduate school to obtain a job in applied field, compared to 60% of current or former master’s students, and 36% of all undergraduates.

Respondents were asked how many students were accepted into their PhD program the same year as them, but to only include those students with a HSB focus. Responses varied from 0 to 30 individuals accepted in a given year, although the majority (72%) indicated that their cohort

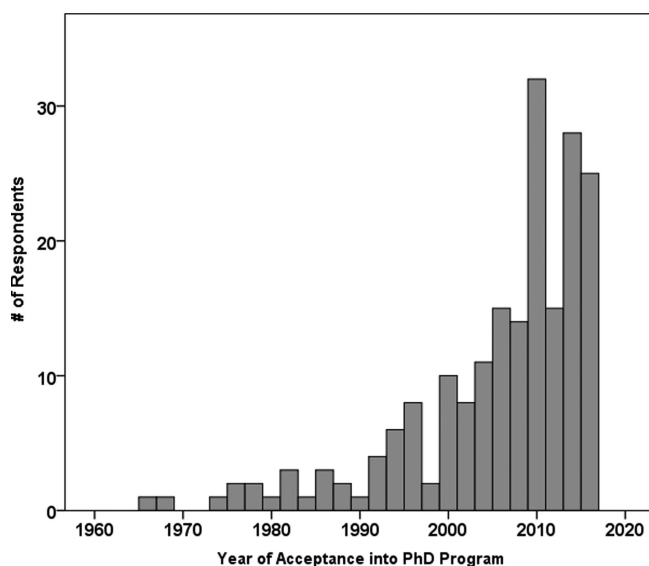


FIG. 9—Number of respondents accepted per year into HSB PhD programs.

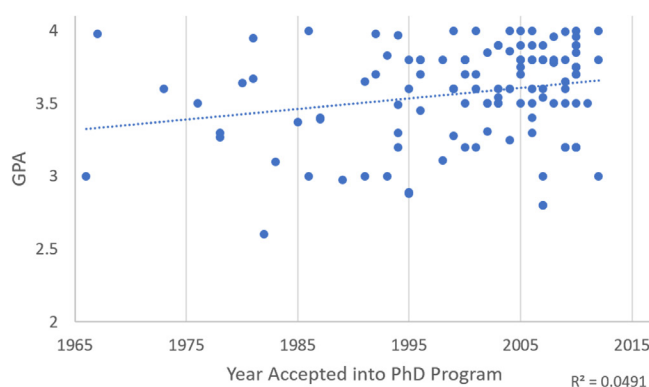


FIG. 10—GPA by year accepted into HSB PhD program.

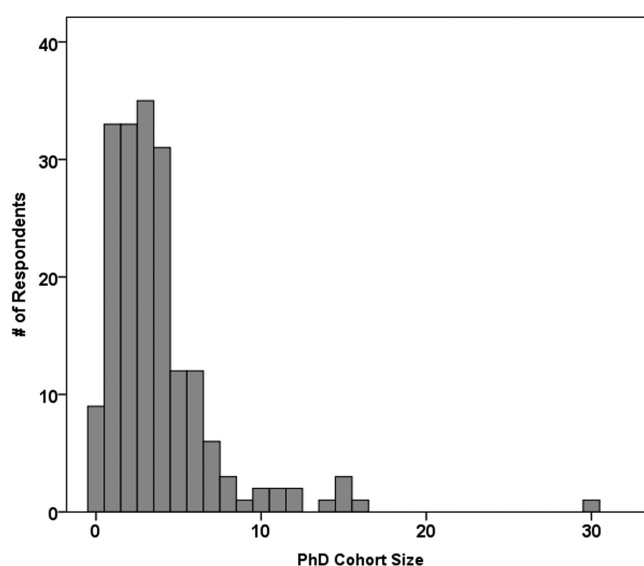


FIG. 11—HSB PhD cohort size.

consisted of four or fewer individuals (Fig. 11). No additional comments were provided from the individual who reported a cohort size of 30.

**Program completion.** Of those who listed a graduation date of 2017 or earlier ( $n = 145$ ), the average time to completion of their doctoral degrees was 6.1 years ( $SD = 2.16$ , with range of 2 to 14 years). Those who had not yet graduated ( $n = 50$ ) estimated that it would take them a total of 4.8 years ( $SD = 1.04$ ) to complete their degree. It is worth noting that individuals in both master’s and doctoral programs underestimated their time to completion, likely a representation of the planning fallacy in regard to their writing a thesis/dissertation (Buehler & Griffin 2015).

One-way ANOVA results indicate that individuals who took time off between degrees took significantly less time in completing their PhD once enrolled (current and past doctoral students  $p = 0.008$ , only those who completed their degree  $p = 0.034$ , with those taking time off reporting completing their degree approximately 1 year earlier). As part of the degree, 89% reported being required to complete a traditional dissertation for graduation, while 11% report being required to complete a dissertation in the format of a certain number of publishable papers.

**Debt.** Sixty-nine percent ( $n = 136$ ) of respondents currently or formerly in PhD programs reported receiving full funding (tuition and stipend), while only 8% reported receiving no funding (5% tuition only, 12% partial tuition, and 6% stipend only). Of those who had completed their PhD, 46% ( $n = 56$ ) reported accruing no debt. Of the 67 respondents who reported debt, the average debt (calculated using median values of the ranges) was \$34,328 (Fig. 12).

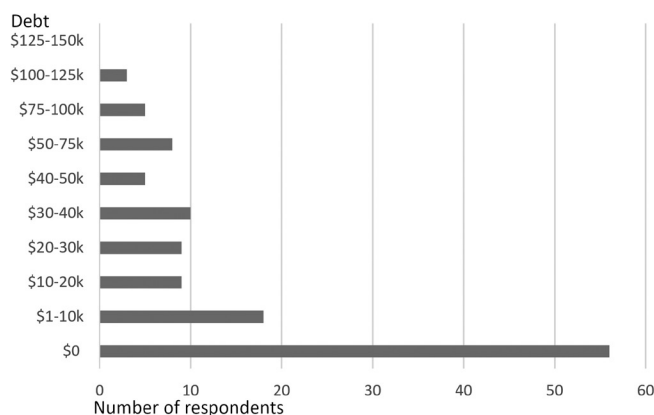


FIG. 12—Distribution of debt accrued during HSB PhD program ( $n = 123$ ). Note that these values only include those who completed the degree and do not include debt accrued by current PhD students.

### Faculty Input on Graduate Admissions

Faculty were asked to complete this portion of the survey, but only if they were involved in HSB graduate student admissions/review of applications.

**Program characteristics.** Of the 55 faculty responses, 23 reported that their program accepted students into the program as a whole, and 32 reported that students are accepted under specific advisers. Further, 29 faculty members were in programs that accepted only master's students, 6 were in programs that accepted only PhD students, and 20 were in programs that accepted both master's and PhD students.

The majority of faculty ( $n = 35$ ) reported that their program had no preference for student career paths, while 10 reported that their program was geared more toward applied students, and another 10 reported that their program was geared more toward academia. Of the 10 geared toward applied students, all respondents were at master's-only programs, with the exception of one that accepts both master's and PhD students.

Overall, faculty respondents reported accepting an average of 2.14 graduate students per year to work under their specific advisement, that is, faculty-specific not program-specific ( $SD = 1.59$ , range of 0 to 8 students). Those accepting only master's students reported accepting an average of 2.81 students per year ( $SD = 1.75$ ), while those only accepting PhD students reported accepting 0.71 students on average ( $SD = 0.25$ ). Faculty accepting both master's and PhD students report accepting an average of 1.56 students per year ( $SD = 0.92$ ).

**Preferences in applicant qualities.** Forty faculty reported having a preferred minimum GPA, while 15 indicated no preference. Of those with preferred minimums, 39 provided a minimum GPA (Fig. 13). All responses were at 3.0 or higher, with an average response of 3.3 ( $SD = 0.26$ ). The highest

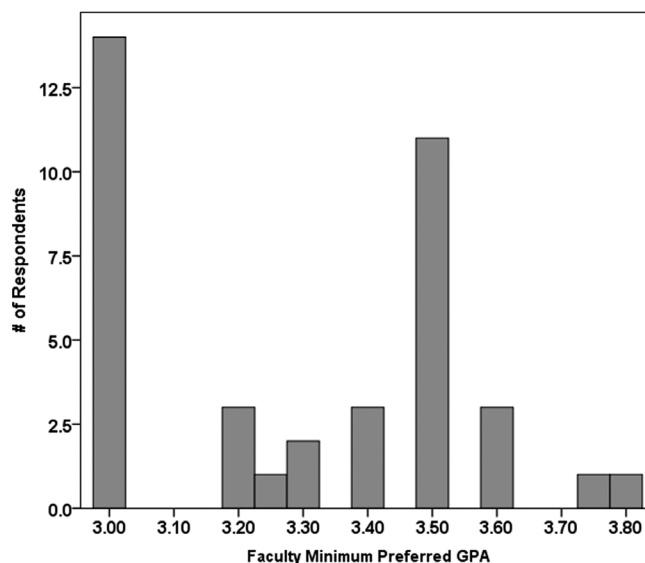


FIG. 13—Preferred minimum GPA for accepting students into graduate programs.

minimum GPA reported was 3.8, which was from a faculty member at a master's only graduate program.

Only 24 respondents indicated that they had a preferred minimum GRE score for accepting students into a graduate program. Of these, 10 individuals indicated that they prefer to see a total score of 300 or above (some specifying 150 in each section), 5 reported values between 301 and 310, and 3 indicated that they prefer to see scores at least at the 50th percentile. The remaining 5 responses provided percentile thresholds ranging from 60% to 80%.

When asked to rank a number of applicant experiences and qualities in terms of importance for acceptance when reviewing graduate student applications, the highest-ranked quality was letters of recommendation (Table 4). This was followed by GPA, coursework related to the discipline, research experience, and laboratory/field experience. Other qualities respondents considered important for acceptance to a program included the letter of intent, writing ability, and proper fit with advisers.

TABLE 4—Faculty-Ranked Elements for Importance in Graduate School Applications.

Topic	Average Rank*
Letters of recommendation	3.2
Letter of intent/Personal statement	3.3
GPA	3.4
Previous coursework related to discipline	4.6
Research experience	4.8
Laboratory/Field experience	5.0
GRE score	5.6
Hard science background	6.5
Biological anthropology background	7.0
Reputation of previous program	7.2

\*Lower rank score considered to be more important.



ability (Fig. 14). When asked what qualities a graduate program in HSB requires in order to be successful, the top five responses faculty listed were applied coursework/experiences, financial support for students and faculty, research opportunities for students, a four-field anthropology approach, and good advising/mentorship (Fig. 15).

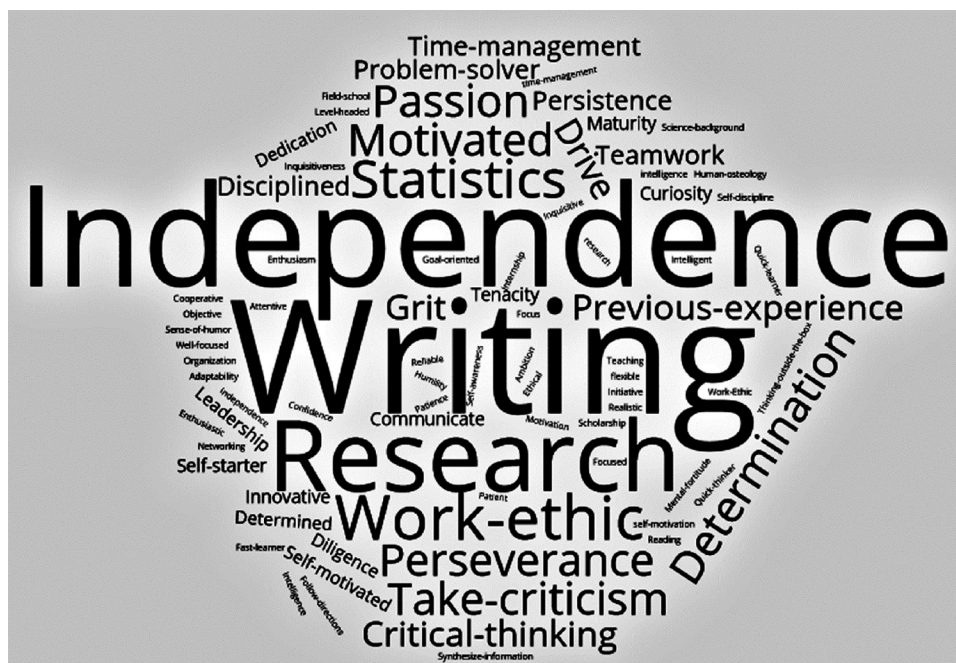


FIG. 14—Word cloud of qualities faculty believe graduate students need to have in order to be successful in a graduate program. Note that the larger the word is, the more often it was mentioned (created using wordclouds.com).



FIG. 15—Word cloud of qualities faculty believe graduate programs need to have in order to successfully train their students. Note that the larger the word is, the more often it was mentioned (created using wordclouds.com).

## Discussion

Many faculty who teach in HSB graduate programs know what they expect out of graduate students, and perhaps the preferences of their institutional colleagues, but may lack knowledge regarding how colleagues in other programs rank applicants, and may be unfamiliar with current trends in student debt and other experiences. It is difficult to guide prospective students interested in HSB without such knowledge. The responses here largely reflect recent and current experiences in HSB graduate programs in the United States, with the majority of respondents having earned their degrees since the year 2000. As such, the results of this survey are aimed to bring awareness to the current state of HSB graduate programs, making graduate student experiences more transparent to faculty and students and spurring discussions about the future of the discipline.

### Applying to HSB Graduate Programs

Survey respondents had an average undergraduate GPA of 3.6, regardless of their highest degree obtained. There was also no significant relationship between GPA and year accepted into graduate programs, although a larger sample of individuals with earlier acceptance years is needed for a more comprehensive analysis of temporal trends. Although a few individuals with undergraduate GPAs below 3.0 did get accepted into graduate programs, faculty responses suggest that these individuals may have been exceptions. Seventy-three percent of faculty respondents indicated that they have a preferred minimum GPA for accepting graduate students, and all of them reported values at or above 3.0, with an average minimum of 3.3. This does not necessarily mean students with a GPA below 3.0 should not apply to graduate school (see Figs. 7 and 11); however, it does suggest that students with lower GPAs will likely have a more difficult time getting accepted into graduate programs and may have to compensate elsewhere in their application. Of the 10 application materials ranked by faculty in terms of importance for application acceptance, GPA was ranked third. These results indicate that undergraduate GPA remains an important variable for graduate program acceptance.

When it comes to GRE scores, respondents' average combined verbal and quantitative GRE scores was 312, with little difference between degree levels. This is consistent with faculty responses that indicated a preference of a total score of 300 or more, *if they had a preferred minimum GRE score*. However, 56% of faculty respondents indicated that they did *not* have a preferred minimum GRE score, with a number of faculty commenting that they felt the GRE did not adequately represent graduate student abilities. GRE score was ranked 7th out of the 10 applicant traits scored by faculty respondents in terms of importance. This lack of emphasis on GRE scores is not surprising given debates on its ability to gauge

student competency. Even after the recent changes to the GRE, there have been multiple calls for various graduate departments to reduce the GRE's emphasis—or completely abandon requiring the GRE—as part of the application process (Clayton 2016; Jaschik 2016; Kuo 2017; Miller & Stassun 2014). Kuncel et al. (2001) examined GRE score and performance in graduate programs and found weak to moderate correlations between GRE score and postgraduate GPA ( $r^2 = 0.21\text{--}0.43$ ). Additionally, previous research has demonstrated that emphasizing high GRE scores minimizes equity in the application and acceptance process for various groups, specifically, females, individuals of African and Hispanic ethnicity, and individuals from low socioeconomic backgrounds (Miller & Stassun 2014). Finally, there are ethical concerns about requiring an exam (e.g., the GRE) that costs approximately \$160 per attempt, as this likely affects the feasibility of applying to graduate school for individuals of lower socioeconomic status. However, the same can be said regarding institution/departmental application fees, which typically range from \$75–\$200 per application.

Of the 10 variables ranked by faculty respondents in terms of importance in graduate school applications (see Table 4), letters of recommendation and letters of intent/personal statements were ranked highest. Considering this, students should aim to interact with their faculty members positively and on a somewhat routine manner to ensure good and detailed letters of recommendation. Students also need to put time and extensive thought into their letters of intent/personal statements. Although the authors did not include writing samples/writing abilities as one of the traits to be ranked by respondents, a number of faculty commented that they also take writing skills into consideration (Fig. 14); thus, the letter of intent/personal statement is typically being evaluated not only on the content, such as student research interests and academic aspirations, but also on the writing quality.

Relevant coursework, research experience, and laboratory and field experience were ranked moderately important by faculty (see Table 4). Having been involved in reviewing graduate applications, one author (HMG) attests that in today's competitive academic environment, the majority of applicants have had some extracurricular activities related to the discipline. Of 283 respondents, only 23 did not report engagement in one of the extracurricular experiences listed in Table 3, and on average, respondents reported being engaged in 3.5 of the 10 extracurricular activities listed during their undergraduate education. Students should be encouraged to get as much exposure and experience as possible prior to applying to graduate schools, not only to make their applications more marketable but also to ensure that the specific discipline is right for them.

Interestingly, faculty ranked a hard science background as slightly more important than a biological anthropology background (see Table 4). This could be inferred to reflect faculties' preference for scientifically minded students capable

of thinking critically and conducting research over those with broader backgrounds in the discipline. Eighty-eight percent of respondents, however, took an introductory biological anthropology course during their undergraduate education, while 73% took a minimum of two cultural anthropology courses, and 65% took a minimum of two biology courses (see Table 2). Percentages of students who took at least two physics, chemistry, or statistics courses were much lower. So, although faculty may place more weight on the hard sciences when reviewing applications, foundational biological and cultural anthropology courses remain important.

The results of the survey support the conceived competitive nature of HSB graduate programs, with PhD faculty accepting only 0.71 students per year on average, and pooled faculty (master's and/or PhD) accepting an average of 2.14 graduate students per year. However, 83% of respondents reported getting accepted into a graduate program the first year they applied, although the majority applied to four or more programs. This high percentage of acceptance may be an artifact of the survey distribution, given that most respondents had been *successfully* accepted into HSB graduate programs (see Survey Caveats below). Acceptance/rejection rates will vary by graduate programs based on variety of factors, including the number of faculty members, current number of students, funding available, and perceived job market. In the second author's (HMG) experience at a forensic anthropology-focused master's program, rejection rates were consistently over 90% given the large applicant pool and few spots available. Personal communication with other HSB faculty suggests this is not an abnormal rejection rate, although students should be encouraged to contact their programs of interest for specific information. Data on program completion are currently unavailable.

Acceptance rates are also worth considering in terms of sustainability of the discipline. Passalacqua (2018) recently examined trends in careers for doctoral biological anthropologists and found that while the amount of jobs advertised per year appears to be nearly sustainable with the amount of PhDs produced per year, there is a diverging trend of decreasing academic job advertisements and increasing doctoral degrees in biological anthropology. It is unclear how sustainable careers for individuals with terminal master's degree currently are, based on a lack of information on rates of master's degrees in biology or forensic anthropology awarded per year in comparison to job or PhD placement. Programs accepting master's students should consider that there may be ethical issues regarding accepting large cohorts of students which may then struggle to find placement after earning their master's degrees.

### Graduate Education Experiences

The majority of respondents attended master's programs focused on forensic anthropology (35%), while the majority

of PhD programs (45%) were more generally focused on biological anthropology. Additionally, when considering the reason for pursuing a graduate degree, individuals who attended master's programs were more interested in applied work, while individuals who attended PhD programs were more interested in academia. This suggests that most individuals interested in applied careers either end their education at the master's level or their interests change as they move on to get their PhD.

The authors were surprised by the fact that 90% of respondents suggested that students take some time off between degrees (either between undergraduate and graduate school or between graduate programs), given the fact that only 63% of respondents actually did so. Those who did take time off reported various reasons for having done so, including taking time to build up their application, ensuring that the discipline was right for them, preventing burnout, and earning an income. Most respondents did comment, however, that during any hiatus it was important for them to stay engaged in some manner in the discipline. Many who did not take time off commented that they wish they had. One cannot help but note that taking time off ends up adding more time to an already lengthy career pursuit, given that respondents on average took 2.5 years to complete a master's and 6.1 years for a PhD (at times consecutively); however taking time off may also help in preventing burnout and thus actually make those individuals more likely to complete their degrees. In fact, of the individuals who completed a PhD, those that took some time off between degrees took an average of one year less to complete their degree.

The majority of respondents reported being required to complete a thesis or dissertation in a traditional format (versus a paper or multi-paper format). Traditional dissertations are typically 200+ page documents separated into chapters, formatted as a single, long-form research paper (Glatthorn 1998). Alternative dissertations (i.e., the journal-ready format) are written in such a way that they are a series of manuscripts ready to be submitted for publication immediately following completion. There is near consensus that the primary purposes of a dissertation are (1) to serve as "a training experience which indicates a candidate is able to complete and communicate a complex research task" and (2) to make "an original contribution to a field of knowledge" (Gerber 2000:479 and references therein). Gerber's sentiment is mirrored by Krathwohl (1994) (Gerber 2000:480): "at the very point students are in the best position to receive training necessary to better prepare them in the new careers, they are being asked to use a writing structure they will probably never use again." These sentiments are reinforced by Duke and Beck (1999), who argue that traditional dissertations are neither widely disseminated (resulting in limited readership) nor generalizable, meaning the vast majority of individuals write only one dissertation in their lives, which results in a missed opportunity to generate knowledge or



skills with long-term benefits. In both cases, journal-ready format dissertations remedy these issues. While there was a very slight trend over time of increasing journal-ready theses/dissertations, it was not statistically significant.

The reported amounts of debt accrued at each academic level varied greatly among individuals. Full funding (tuition and stipend) was more prevalent among PhD students (69% had full funding) than among master's students (33%). One-third of respondents reported receiving no funding for their master's degrees, while only 8% reported no funding for their PhD. Forty-eight percent of respondents reported accruing no debt during their undergraduate education, compared to 28.5% during a master's program and 46% during a PhD program. Higher numbers of undergraduate scholarships and parental contributions during undergraduate education may play a role. Although PhD programs are more competitive, accepting fewer students per year than master's programs, they were more likely to provide funding. In no cases were there significant changes over time to the amount of debt accrued. It is worth noting that women in the United States accrue approximately 14% more student debt than men (American Association of University Women 2017), meaning women in forensic anthropology may be predisposed to having more debt than their peers. This is also significant considering women often earn less than men, meaning it may add an additional financial burden (American Association of University Women 2017). Finally, in terms of equity, the costs associated with fieldwork, which may also contribute to student debt, should also be considered (Freund 2017).

### Survey Caveats

The authors distributed this survey to listservs and social media associated with HSB or biological anthropology groups, with audiences mostly composed of those individuals who either successfully became HSB graduate students or obtained careers in HSB. Individuals who may have applied to HSB graduate programs, were not accepted, and subsequently changed their career directions were not likely to have received the survey. This must be kept in mind when interpreting any of the survey results, as the results essentially reflect those characteristics and experiences of the successful HSB graduate students.

Although the survey was not restricted to U.S. individuals, and did receive responses from 25 individuals located outside the United States, the sources used to distribute the survey primarily had U.S. audiences, and the nature of the survey questions were geared toward the U.S. academic system. As such, the results of this survey primarily reflect experiences related to U.S. HSB graduate programs. The results, however, are not exclusive to the United States, as the comment regarding the 60-student cohort indicated that at least that specific responder studied in the UK.

As with all surveys, the information collected is self-reported by participants and thus may contain some errors or biases. We recognize that many of the questions required respondents to recall information from years past, and thus may contain estimates. Some respondents provided GRE scores in forms of percentages and others in terms of scores. We allowed either to be provided, as we felt that respondents should be able to provide whatever information they felt most confident recalling. The GRE has also changed format over the years, and all responses were converted to the new GRE score format using a concordance table provided by ETS.org. These GRE conversions introduce another potential source of error.

In retrospect, given ongoing discussions regarding diversity in biological and forensic anthropology, the authors wish they had also collected information regarding age, sex, gender, and ethnicity (Antón et al. 2018; Passalacqua 2018; Passalacqua & Pilloud 2018; Turner et al. 2018). Passalacqua (2018) noted that females represented approximately 66.8% of biological anthropology PhDs awarded between 2014 and 2016, while Antón et al. (2018:163) found that only about 10.8% of biological anthropology faculty identified as non-white. Passalacqua and Pilloud (2018) recently discussed the lack of diversity in forensic anthropology and the need for increased diversity as something faculty should consider as part of graduate school programs, as this is the first hurdle toward increasing diversity overall in a discipline. It has been argued that the inability of non-white students to identify with non-white faculty is one of many contributing factors to their success (Gibbs et al. 2014; Hess & Leal 1997; Krupnick 2016; Passalacqua 2018). Thus, if biological and forensic anthropology cannot engage with and retain non-white undergraduate students, this will have implications for future non-white graduate students and non-white faculty, continuing the cycle of limited diversity (Passalacqua 2018).

Although the authors preliminarily investigated temporal trends in the survey responses based on the years in which respondents were accepted into master's and PhD programs, the lack of significant trends is potentially related to the low sample sizes of respondents who were accepted into programs prior to 2005 for master's programs and prior to 1990 for PhD programs. In order to fully investigate any possible trends, greater sample sizes are needed. With 283 respondents who answered the majority of relevant questions, this survey is a good start to understanding discipline-specific experiences of our HSB graduate students, but it is not comprehensive. The authors were also aware that there may be other sample biases, such as responses from uneven number of students or faculty from specific programs. Although the map of respondent locations (see Figs. 1 and 2) suggests a moderate degree of diversity, at least across the United States, this bias remains. Given that even students within the same programs may have different experiences and that faculty within the



same program may rank applicant and program qualities differently, we did not limit the number of responses per program, and in order to keep survey anonymity we did not collect information regarding program names.

Finally, it should also be emphasized that the results presented here represent general trends as reported by respondents. Each program may have its own requirements, and even within each program each faculty member may have his or her own preferences, and in the end each application is unique and typically handled on a case-by-case basis. The results presented here are meant to provide additional insight to prospective HSB graduate students regarding faculty and peer reports about application and graduate education experiences.

## Conclusions

Students considering pursuit of a graduate degree should be encouraged to gather as much information as possible about the graduate education process, potential graduate programs, and their current and future job markets. This pre-application research should include general information collected by graduate education from national surveys; specific information regarding potential schools, programs, and employment opportunities; and input from those who have undergone similar experiences. This survey attempted to address the latter by collecting information from current and former graduate students regarding their experiences applying to and attending graduate programs in HSB.

One aim of the survey was to inform students of discipline-specific graduate student experiences in order to better prepare them for HSB graduate applications and the road that lies ahead once accepted. In addition, this survey attempted to examine if competition for graduate education may have increased; however, no significant changes over time were found in GPA or GRE scores of students accepted to graduate programs in HSB. We also hope that the results of this survey have positive impacts on the discipline in general by informing undergraduate advisers and graduate faculty advisers of current factors affecting students in HSB graduate programs that will likely have impacts on these student's professional careers as well (e.g., amount of debt accrued during their education).

In many ways these results are preliminary, as larger sample sizes and greater diversity are needed; however, this project opens the door to discussions regarding applicant and graduate student expectations as well as graduate student life quality (when accounting for accruing debt as well as concerns of burnout and the high number of individuals who suggested taking time off). In many ways, these data are foundational and future studies can build upon this framework to address additional questions or concerns affecting a

multitude of issues facing undergraduate students, graduate students, and junior and senior career individuals.

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