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Perceptions of Race and Ancestry in Teaching, Research, and Public Engagement in Biological Anthropology

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Short Title: Perceptions of Race and Ancestry in Biological Anthropology

Abstract

The concepts of race has a complex history in the field of biological anthropology. Despite increased recognition of the racist origins of the discipline, there remains little agreement about what the concept means, how it is used, or how it is discussed. The present study presents the results of a survey of biological anthropologists to investigate the relationship of biological anthropology/ists with race and ancestry. The survey focuses on the areas of research, public engagement, and teaching as related to these concepts. Results indicate that a large majority of biological anthropologists argue for the separation of race (as a social not biological concept) from ancestry. The majority of respondents argued that ancestry categories should be based on

geography (e.g., Asian, European, and African), and more anthropologists thought the terms "Hispanic/Latino" were inappropriate ancestry categories. While the majority of respondents felt that discussions of these terms were not matters of "political correctness," nearly a quarter of respondents suggested that concerns over the moral and ethical implications of research (e.g., photos, terminology, ancestry, etc.) result in the silencing of anthropological research. Overwhelmingly, respondents felt that anthropologists have a responsibility to ensure the avoidance of misappropriation of their work in race science and by white nationalists/supremacists. Some differences in survey responses were found among respondents in relation to sub-discipline, educational level, location of respondents, age, self-identified racial/ethnic categories, and gender. In regard to teaching, survey results indicate that these concepts are minimally covered in university classrooms. When taught, topics focused on the colonialist/racist history of anthropology, the presence of white privilege/supremacy, and racism. Based on the results of this survey, we argue for greater public engagement on these concepts, a standardized system of teaching race and ancestry, and a disciplinary conversation about practice and terminology. In this way, biological anthropologists can best place themselves to combat racism in a socially responsible way.

The concepts of race and ancestry have a complex and long history in the field of biological anthropology. The discipline's origins are admittedly steeped in racism, colonialism, and typology, which the field has grappled with over the last 100+ years (e.g., Brace 2005; Edgar and Hunley 2009; Ta'ala 2015; Ousley et al. 2018) and continues to grapple with. Yet, in this time, we have been unable to agree on any one definition to encapsulate the discipline's stance on race and ancestry (Armelagos and Goodman 1998), nor have we developed consensus agreement on how to research, teach, or present on race, ancestry, and/or human variation.

To attempt to understand how biological anthropologists approach race, a series of surveys and content analyses were conducted over several decades beginning in the 1970s. Lieberman and Reynolds (1978) surveyed 141 anthropologists registered in the "Guide to Departments of Anthropology" in the American Anthropological Association (AAA) with physical anthropology noted as a specialization. Based on the results of this survey, the authors identified two primary positions: *splitters*, who continued to argue for the existence of biological distinctions in race; and *lumpers*, who argued race did not exist. In this survey, the majority of practicing anthropologists were classified as *splitters* or *intermediate splitters* who argued race was a biologically valid concept. The authors found those in the *splitters* group tended to be of a more privileged status (highlighted as exhibiting one or more of the following: either first or last child, an only child, male, paternal and maternal grandparents born within the United States, conservative Protestant or Catholic mother, and born in southern or border states). Those in the *lumpers* group were argued to be of a more marginalized status, including female; grandparents born outside of the United States, Canada, or northwestern Europe; having a Jewish mother; and/or born in the "Third World" (Lieberman and Reynolds 1978).

Some time later, Littlefield and colleagues (1992) examined textbooks in biological anthropology over time to identify changes in the primary position these books held regarding the race concept. This project worked with the assumption that these texts would approximate the primary position in the discipline at the time of publication. The study found that prior to the 1970s, the majority of textbooks continued to argue for a biological racial concept, despite the increasing attacks against the race concept that had begun several decades earlier in the 1940s and 1950s (e.g., Montagu 1942; UNESCO 1969). During the 1970s, books that continued to argue for biological races were a minority, with the majority arguing races were a social construct. The authors argue this shift was concomitant with a larger number of anthropology programs and a changing demographic of students and their influence on anthropologists resulting in greater receptivity to this new conceptualization of race. Cartmill (1999) argued, however, that by the late 1990s, there was not enough evidence to suggest a significant rejection of the race concept having occurred in the field. Through an examination of articles published in the *American Journal of Physical Anthropology* (*AJPA*), the authors suggested that there had been no significant decline in the number of papers published that dealt, in some way, with the race concept.

Lieberman and colleagues (2003) published the results of an additional series of surveys conducted in 1985 and 1999 among biological anthropologists listed in the *AAA Guide 1998-1999*. The researchers identified an increase in disagreement among biological anthropologists (41% to 69%) that biological races exist in modern humans. Furthermore, in response to Cartmill's (1999) analysis of *AJPA* articles, the authors examined papers published in 1931, 1965, and 1996 from the same publication. These years were selected to capture before, during, and after the time period identified, by the authors, as the primary shift in disciplinary consensus

of the race concept (i.e., 1960s-70s). Although Lieberman and colleagues' (2003) asserted that the publication trends in the *AJPA* corroborate the decline in support of biological race identified in their survey work, Cartmill and Brown (2003) highlighted several issues with the study. Cartmill and Brown (2003) argued that the *AJPA* sample was restricted to a limited number of years and the surveys were not necessarily restricted to only those individuals in physical anthropology, were concentrated in the U.S., and the response rate in the 1999 survey was smaller than in the 1985 survey work. Therefore, they concluded that the abandonment of the biological race concept had not reduced in prevalence among practitioners.

More recently, studies published by Wagner and colleagues (2017) and Ifekwunigwe and colleagues (2017) among members of the American Anthropological Association and by Nelson and colleagues (2018) among members of multiple genetics professional organizations addressed these same issues. These researchers found an increasing agreement that race is a social construct; although, there was greater disagreement among geneticists. These studies reevaluated the concept of *lumpers* and *splitters*, instead suggesting there were *squatters* (no biological importance to race), *shifters* (no biological importance to race, but a social existence), and *straddlers* (biological and social importance to understanding race). As such, these studies revealed a complex interaction between anthropologists and the race concept and disagreement as to how it should be treated in anthropological practice (Ifekwunigwe et al. 2017; Wagner et al 2017).

Within the current reflection on race in biological anthropology, the field of forensic anthropology has been particularly critiqued for its continued research and application of the estimation of ancestry. Due to the necessity of working within a medicolegal context influenced by the cultural framework of the United States, forensic anthropologists have worked with the

concept of racial classifications, correlating biological information to social folk taxonomy (Sauer 1992; Edgar 2009; Ousley et al. 2017). Forensic anthropology has traditionally used the tripartite system of classification ("African," "Asian," "European"), particularly with the use of trait lists of skeletal and dental features (e.g., Rhine, 1990). There has been a shift in the field to more statistically based methods for ancestry estimation that are multivariate in nature (e.g., Hefner and Ousley 2014; Hefner et al. 2014; Navega et al. 2015; Scott et al. 2018; Maier 2019; Go and Hefner 2020; Nikita and Nikitas 2020). However, the practice of ancestry estimation has been widely critiqued in the literature by biological anthropologists (e.g., Armelagos 2003; Shanklin 2000; Smay and Armelagos 2000; Williams et al. 2005; Bethard and DiGangi 2020). Despite these critiques, there is continued use of the term race in the forensic anthropological literature, as well as racial/social terminology (Craig and Latham; 2020; Maier et al., 2020).

Within the field of forensic anthropology, the concept of ancestry estimation has seen its own professional change (for a more detailed review of ancestry estimation see Cunha and Ubelaker 2019 and Dunn et al. 2020). Researchers are increasingly incorporating models of population history and genetics into their analyses (Spradley and Stull 2018). Work of this nature has involved investigating more regionally specific samples to investigate potential phenotypic differences within larger groups, in addition to examining the impact of gene flow on population structure and the adoption of additional categories and reference samples for ancestry estimation (Spradley et al. 2008; Edgar 2013; Hughes et al. 2013; George and Pilloud 2019; Gross and Edgar 2019; Go and Hefner 2020; Maier and George 2020). A case in point is the category of "Hispanic." Although often described as an ethnic group due to its basis in language (i.e., Spanish), "Hispanic/Latino" has been treated as a comparable unit of analysis to the traditional tripartite scheme (i.e., Africa, Asia, Europe). Furthermore, researchers have increasingly moved

towards either more specific refinement of the location of Hispanic individuals in an attempt to more accurately reflect differential population history (e.g., South Florida Hispanic, New Mexico Hispanic [Edgar 2013], Southwest Hispanic, etc.) or have adopted use of the term "Latino/a/x" in an attempt to more broadly include those populations whose native language is not Spanish (e.g., Adams and George 2018; Hughes et al. 2019; Maier and George 2020).

There has been a documented rise in the presence and activity of racial extremist hate groups (HateMap SPLC 2020) and increased attention in the media regarding race science (e.g., Evans 2018; Harmon 2018; Fazackerley 2020). Although the terms race science and scientific racism have often been used interchangeably (Sussman 2014), for the purposes of this study, these terms are differentiated. Race science refers to research conducted with the intention of enforcing racialist ideologies, hierarchies, and biological hereditarian differences. Importantly, this definition combines motivations and interpretations of research (Thompson 2006; Sussman 2014). This excludes biological research into the effects of systemic racism and institutionalized hierarchies on the lived experiences of marginalized groups, for example. One of the most notorious fields fostering this type of research involves psychometric studies attempting to establish hereditarian ideas of intelligence and personality differences between racial groups. Other forms of race science more specific to biological anthropology may include the use of genetics or craniometrics to correlate to intelligence differences or differences in evolutionary trends between racial groups. Scientific racism, however, is separated as a concept from race science to focus on the use of research to reinforce racist ideologies. It is important to tease these concepts apart as, while race science is, in effect, a form of scientific racism, scientific racism does not require race science to exist. Scientific racism more directly relates to the practice of using research, while race science refers more specifically to the actual production of racist

research. The motivations and methods may differ between the development and use of research and analyzing these concepts separately may contribute to anthropology's ability to combat the situation.

The reality of increasing activity and attention of racial extremists and race science, as well as the continued debate about the foundations of ancestry estimation and the language the discipline uses in research and identification necessitates a clear look at how we, as biological anthropologists, engage with race. Particularly as biological anthropological research is often evoked in the maintenance of racist ideologies and research (Adams and Pilloud 2020). To address these issues, this study represents a survey of biological anthropologists in which we investigate three main areas. First, attitudes towards ancestry and race and their use in forensic anthropology are investigated. Second, biological anthropologists' views as to the professional and ethical obligations in confronting the misappropriation of work by race science researchers and racial extremists is explored. Finally, how race and ancestry are currently being taught in the classroom is outlined. This work seeks to 1) explore under-investigated aspects of previous survey work; 2) assess inter-individual variation in how biological anthropologists view the interaction of race and ancestry in forensic anthropology and the obligations of biological anthropologists in the classroom and in the public; and 3) assess potential areas of improvement or dialogue regarding the use of race and ancestry in anthropological research, practice, and discussion.

Materials and Methods

An electronic survey was developed using the program Qualtrics (Snow and Mann 2012). The survey was found exempt from Institutional Review Board approval through the University of

Nevada, Reno (1410660-1). The internet link to the survey was distributed among members of the American Association of Physical Anthropologists, Western Bioarchaeology Group, and Dental Anthropology Association, as well as the BioAnthropology News page on Facebook. The aim was to distribute the survey among a broad group of professionals and professional organizations to capture a large sample of respondents, as well as those of a different theoretical perspective (Wagner et al. 2017) than those of previous studies. Responses were all anonymous, with no identifiable information collected.

The survey consisted of various demographic questions, which included degree level, sub-disciplinary focus, racial/ethnic identity, gender identity, location within or outside of the United States, and age. The bulk of the survey consisted of 38 questions (Table 1) on a five-point Likert scale from strongly disagree (coded as 1) to strongly agree (coded as 5). For these questions, Kruskal-Wallis and Dunn's pairwise comparison tests were used to assess if there were disciplinary (e.g., educational background and sub-discipline affiliation) or social (e.g., gender, age, etc.) differences in responses to these questions (R package *dunn.test;* Dinno 2017). As there were only two groups for the location of respondents (Within or Outside of the U.S.) a Mann-Whitney U-test was calculated for these comparisons in base R. As multiple comparisons were being made, an alpha correction was applied to these tests to account for the increased chance of Type I error. Although Bonferroni correction is a popularly used technique, it has received criticism for being overly conservative (Chen 2017). Therefore, Hochberg p-adjustment was applied in this analysis. Although statistically significant differences may be found at the 0.05 and Hochberg p-adjustment level, suggesting significant differences between groups, it is important to recognize that such differences may not necessarily mean that one group agrees with a statement and the other group disagrees. Rather, groups may both generally agree or

disagree with a statement; however, the strength of their agreement or the range of responses may be different. Therefore, as a measure of central tendency (given the use of ordinal categorical data), the median was calculated. The mode is presented as a measure of the most frequent response by participants in each group. The interquartile range was also calculated as an assessment of the similarity in strength and distribution of responses between groups. Due to the number of questions and number of comparisons being made, only those pairwise comparisons found to be significantly different at the Hochberg level are shown. The Supplemental Information 1 contains the Kruskal-Wallis/Mann-Whitney test statistics and p-values for each test, as well as the post hoc matrices for those Kruskal-Wallis tests that were significant at the 0.05 level. For the analyses between respondents of different self-identified racial/ethnic and gender identities, post hoc test values for all groups with sample sizes less than 10 are not presented. Although these tests were run and the values displayed are indicative of all groups included in the analysis to ensure all identities were represented, the results for small sample size groups were removed for the safety of the respondents. All statistical analyses were performed in the R statistical computing environment (R Core Team 2019).

The survey also contained a third section that focused on teaching with questions that were more open-ended in response (Table 2). Response frequencies were calculated for questions 1, 2, 3, and 4 and large themes were extracted from the text data in Questions 3a and 4a using the software program NVivo (QSR International, 1999). This software program imports textual data and performs an automatic coding system whereby similar concepts are aggregated into similar ideas. Additionally, manual codes may be added to produce new categories and focus on other themes than the ones generated by the program. These categories were used to assess how practitioners conceive of and teach race and ancestry.

The concepts of race and ancestry as asked in these questions allowed some level of flexible interpretation. For close-ended responses, questions specifically referring to race and ancestry were conceptualized using typical disciplinary understanding. Race as used in this study refers to the definition as outlined by the American Association of Physical Anthropologists, which refers to the social categorization of people that may have originally been derived from superficial phenotypic characteristics but has been used to enforce a racist system in the United States (Fuentes et al. 2019). Ancestry, however, refers to the biological variation present in modern humans impacted by microevolutionary forces and cultural practices (Passalacqua and Pilloud 2018) that exhibits geographically patterned variation (Konigsberg et al. 2016). The open-ended questions about how respondents taught these concepts allowed the opportunity to understand inter-individual variation in how these concepts were conceptualized.

Results

A total of 307 respondents answered at least one question in the survey; therefore, sample size for each question varies. The demographic and locational data of respondents is outlined in Table 3. Age of respondents ranged from 18 to 84 years, with a mean of 35.38 years and 50% quartile range of 26 to 43 years. Ages were grouped by decade and coded as follows: 1 (18-29 years; only one individual under the age of 20 who responded), 2 (30-39 years); 3 (40-49 years), and 4 (50+; up to 84 years). As the sample size was 28 for the 50-59 year range and 12 for the 60 to 84 year age range, to make these cohorts more comparable in sample size to the other age groups, these years were collapsed for statistical analysis. The majority of respondents held a PhD (n=112, 43.92%), identified as White/European American (n=188, 73.73%) and women (n=196, 76.86%), and were located within the United States (n=193, 75.69%). The majority of

respondents identified sub-disciplinary focus as either bioarchaeology (n=107, 41.96%) or forensic anthropology (n=74, 29.02%).

This lack of diversity in the respondents limited the ability to compare results between different racial and gender identities, and location. However, based on racial demographic composition of the current sample, this make-up is similar to that found in the AAA (Wagner et al. 2017; Antón et al. 2018), and more diverse than that found in the 2014 survey of the AAPA (Antón et al. 2018). It has been noted that biological anthropology lacks racial diversity in membership (Antón et al. 2018). The representation of women respondents is significantly greater than either of these previous studies, although representation of non-U.S.-based respondents is higher. The primary difference between this and previous studies is the greater representation of bioarchaeologists and forensic anthropologists. This may be due to the particular interest of race and ancestry in these two disciplines, resulting in a bias towards their representation. These findings are further supported when examining the disciplinary distribution of respondents in this study compared to that of Antón and colleagues (2018). Whereas in the present study approximately 70.0% of respondents listed forensic anthropology or bioarchaeology as a primary discipline of interest, 2014 and 2017 surveys of the AAPA indicate 12.1% and 15.5% of respondents, respectively, identified bioarchaeology and forensic anthropology as subdisciplines of interest. When "skeletal and dental biology" and "paleopathology" are added into those numbers, these percentages increase to 43.6% and 35.8%, respectively, still indicating a dramatic overrepresentation of forensic anthropology and bioarchaeology in this survey. This is also highlighted by the representation of paleoanthropology, which, in the 2014 (16.3%) and 2017 (20.6%) surveys represented the second highest percentage of respondents, whereas paleoanthropology has one of the lowest

response rates in the present analysis. Both of these projects suffer from the general drawback of survey work where there tends to be incomplete response rates (the 2014 and 2017 surveys had significantly higher response rates than the present work), and the purpose of these surveys differed. The 2014 and 2017 surveys tried to capture general demographic information about the AAPA membership. Therefore, the overrepresentation of these two subdisciplines likely reflect the heightened interest and importance of race and ancestry in their work and must be considered as a potential bias in this project.

General Trends

Table 4 displays results of the survey (see Table 1 for questions and question number). In general, based on the responses to survey questions, respondents largely agreed that there was a difference between race and ancestry (89.66%; Q17), with 91.00% of respondents agreeing that race is a social concept (Q30). Similarly, 90.58% *disagreed* that race is a biological concept (Q29). Approximately 28.00% of respondents argued that ancestry itself is a social concept (Q31). Only 21.83% of respondents argued forensic anthropologists estimate "biological race" (Q18). Nearly half of respondents (46.96%) agreed that forensic anthropologists were successfully able to estimate an individual's ancestry (Q19), and 11.79% of respondents felt that forensic anthropologists should no longer estimate ancestry (Q20). Just over one-quarter of respondents (27.95%) argued forensic ancestry estimation reinforces racial typologies (Q21). The majority of respondents argued terms should be geographically based (Q22), rather than social (Q23) or nationality/socially based (Q24). The majority of respondents (63.39%) also agreed that the traditional tripartite scheme of ancestry estimation (e.g., Asian, European, African) is appropriate (Q25). Additionally, more anthropologists argue "Hispanic/Latino"

(42.79% agree versus 25.68% disagree) are inappropriate categories for forensic ancestry estimation (Q26).

Overwhelmingly, respondents agreed (92.55%) that anthropologists have a responsibility to ensure the avoidance of misappropriation of their work (Q1), including by directly addressing those individuals conducting race science (86.56%; Q2) and white nationalists and supremacists who utilize anthropological research to reinforce their ideologies (84.62%; Q37). Only 69.36% of anthropologists argued it was ethical to be involved in social and political movements (Q12).

There were some concerns over the discussion of terminology and ethical implications of research. Although most respondents (90.95%) argued that discussions regarding terminology are not matters of "political correctness" and are relevant to bioanthropological research (Q8), nearly a quarter of respondents (22.27%) suggested that concerns over the moral and ethical implications of research (e.g., photos, terminology, ancestry, etc.) result in the silencing of anthropological research (Q11). Furthermore, 46.12% of respondents agreed that "political correctness" (defined in this study as the avoidance of certain research topics, language, or discussions in an attempt to not insult or marginalize various groups) is an issue in biological anthropology (Q7).

Disciplinary Differences

There were noticeable disciplinary differences in several of the questions. Questions found to be statistically significant using Kruskal-Wallis and pairwise Dunn's tests are presented in Table 5 (and see Supplemental File 1). The majority of these differences occurred between bioarchaeology and forensic anthropology (75.0%), followed by bioarchaeology and paleoanthropology (12.5%), and forensic and paleoanthropology (12.5%). Approximately 88.0%

of the statistically significant differences involved forensic anthropology in some capacity. Compared to forensic anthropologists, bioarchaeologists disagreed with the use of categories like "African American" or "White" when investigating phenotypic variation (p=0.002). Furthermore, to a lesser degree, bioarchaeologists were more neutral (compared to the general disagreement found among forensic anthropologists) towards the idea that forensic anthropologists reinforce racial typologies (p=0.011) and were more neutral (though still generally disagreeing) with the idea of ancestry being a social concept (p=0.014). Both bioarchaeologists and forensic anthropologists generally agreed that ancestry estimation should continue being taught in anthropological courses, though agreement was less pronounced among bioarchaeologists (p = 0.001). Though these responses were significantly different, the strength of this difference was not strong based on observation of the median, mode, and IQR. Forensic anthropologists, unsurprisingly, were more favorable regarding ancestry estimation, tending to disagree that ancestry estimation reinforces racial typologies (p=0.011) and that the practice should end (p=0.007). However, interestingly, the majority of these respondents scored "disagree" rather than "strongly disagree" and, in the case of reinforcing ideas of biological race, there seemed to be considerable variation among forensic anthropologists as to whether the discipline supported the idea. Paleoanthropologists tended to have less concern for discussing racial/ancestral terminology, research, and disciplinary diversity compared to bioarchaeologists (p=0.015) and forensic anthropologists (p=0.003).

Differences among Degree Level

Differences were also found between individuals based on educational attainment (Table 6 and Supplemental File 1). The majority occurred between individuals with Master's degrees

compared to other degrees of educational attainment. Those with Master's degrees tended to agree more than individuals with Bachelor's degrees that "Hispanic/Latino" is not a valid category for use in bioanthropological research (p=0.018). Compared to those working on completing their Bachelor's degree, Master's degree individuals tended to agree that anthropologists should interact directly with the public regarding race and ancestry (p=0.005). Those with a doctorate tended to agree more than those with a Master's degree that concerns over ethical and moral implications of research may result in the silencing of research (p=0.022); however, they were more likely to disagree that the tripartite model of ancestry classifications is an appropriate scheme (p=0.015). Compared to those completing their Bachelor's degree, those holding a Ph.D. tended to agree that anthropologists should interact directly with the public (p=0.012).

Differences in Location of Respondent

There were a number of differences between anthropologists who worked in the United States and those who worked outside of it; however, only one of these was significant after the Hochberg p-adjustment (Table 7 and Supplemental File 1). In general, practitioners within the United States tended to have higher levels of agreement that biological anthropological research is at risk of misappropriation by white nationalist/supremacist groups or individuals (p=0.059).

Demographic Differences

Differences between age groups showed some significant differences (Table 8 and Supplemental File 1). Individuals in the 50-84 year age range showed greater variability in their concerns over ethical and moral implications of research result in the silencing of anthropological research

compared to individuals in the 18-29 year age category (p=0.011). Though both individuals in the 50-84 and 18-29 year age ranges responded primarily around "neither agree nor disagree," those in the 18-29 year age range typically responded in greater disagreement. Those individuals in the 50-84 year age range, however, were more variable in their agreement or disagreement with this statement. These two age categories also significantly differed in their views as to whether race is a social concept (p=0.003), with individuals between 50 and 84 years less often strongly agreeing that race is a social concept.

No differences were found significant after the Hochberg p-adjustment for responses between different racial/ethnic identity groups.

Only one significant difference was found for those of different gender identities after the Hochberg p-adjustment (Table 9). Those who identified as a man were more likely to agree that forensic anthropological ancestry categories should be nationality and socially based (e.g.," American White," "African American," "Asian American") than those who identified as a woman (p=0.023).

Teaching

Approximately 43.0% of respondents stated that they currently do not teach. The majority of these respondents were people who were either completing their undergraduate programs or were currently going through graduate programs. Approximately 11% of individuals who did teach claimed that they do not teach about race or ancestry. Whether this is due to courses taught that do not have a direct relation to these topics or due to a decision to not teach such concepts is not evident from the data. Introduction to Biological Anthropology courses are the primary type of

course in which these concepts are taught, followed by Forensic Anthropology, Osteology, and Human Variation (Figure 1).

Of those individuals who reported specific techniques in which they taught race and ancestry, the majority of individuals reported a combination of lectures and open discussions. Some respondents reported the incorporation of reading materials like journal articles, as well as news reports and current events as a contextual basis to frame discussion about race and racism. Although in and out-of-class activities were mentioned, no specific examples were provided. Specific concepts mentioned included white privilege, the history of defining skeletal ancestry, current events, human rights, race science and eugenics, and the evolution of phenotypic traits commonly associated with racial/ancestral groups.

When discussing what aspects of race, racism, ancestry, white privilege, and white nationalism or supremacism are discussed in the classroom, a variety of responses were provided in the open responses. These largely focused on concepts of human variation, historical context, white privilege, the history of anthropology, and cultural context. Most respondents examined the intersection of race and ancestry with type, origin, and potential benefits of biological variation and how this may be utilized in ancestry estimation; how colonialism, racism, and concepts of "admixture" or "purity" have affected modern perceptions of race and ancestry; the intersectionality of identities, as well as the existence of white privilege and supremacy and their effect on systemic racism; the direct impact of anthropology on public and academic perceptions of race and ancestry; and the temporal and cultural variation and context of racial categories and lived experience. Major ideas are presented in Table 10.

Most responses to how race and ancestry are taught in the classroom indicate a focus on race being a "social construct," followed by an emphasis of being a "cultural construct" or some

variation of being "culturally defined or culture-specific." At least 12 responses specified the presence of racial groups, with one response arguing that race represents a taxonomic group that has been misapplied to human variation, as well as several responses that used the term "biological concept of race" or "biological race" or used "clines" to describe "Blumenbachian race." Several respondents emphasized either a process of self-identification or an imposition from outside institutions of people into a particular racial category. Furthermore, of those who specified what about the concept of race was taught in the classroom, many brought up the focus on how phenotypic/biological variation informed the categorization of racial groups, the biosocial implications of race, and the history of the race concept in anthropology. Two individuals specified race does not exist and two individuals argued race should no longer be used, with one individual specifically highlighting that forensic anthropologists should no longer use the concept as a "unit of analysis."

As opposed to race, responses to how ancestry is taught in the classroom primarily focused around its biological underpinnings of the concept. A nearly equal number of responses specified genotypic (n = 11) or phenotypic (n = 10) components to ancestry, as well as just broadly "biological" (n = 14). In addition, geography was one of the primary terms consistently brought up among respondents, followed by statements regarding origin, population history, (micro)evolution, and adaptations and clines to a smaller degree (though the word "variation" was brought up frequently). Three individuals specified the term "biogeography/ic" to highlight both the biological and geographic qualifiers brought up by other respondents. Seven individuals specifically brought up the presence of groups (e.g., "African," "European," "Asian," "Asian/Native American"), with one individual specifically saying these groups are "non-discrete." Several individuals tied together the concepts of race and ancestry, by either

specifically saying "ancestry" is a "proxy for race," that ancestry may or may not reflect "the cultural ideas of 'race,'" that ancestry serves as a "'soft term' for race," that ancestry is also "biological race," and that the two terms can be used interchangeably. Several respondents connect the term "ancestry" to forensic anthropology ancestry estimation and bioarchaeology (to a lesser degree). Four individuals specifically stated they mention the problematic nature of "ancestry," to include that the concept has "caveats, pitfalls, and shortcomings;" "determinations can be misleading and unscientific;" and one individual stating, "I also say it is mostly garbage, to be honest."

Discussion

Results of this survey confirm that anthropologists agree with the paradigm that there is a difference between race and ancestry, with the former being a social construction and the latter largely focusing on geography and population history. Regarding the apportionment of human variation and the process of forensic ancestry estimation, the majority of the field responded in agreement that the traditional tripartite model is insufficient (63.9%); however, this agreement is not overwhelming. Furthermore, the use of "Hispanic/Latino" as an additional category for use in identifying decedents (e.g., Birkby et al. 2008; Spradley et al. 2008; Edgar 2013; Hefner et al. 2015; Dudzik 2019; Maier and George 2020; George 2020) received mixed response. Although the largest percentage of respondents argued it was an inappropriate category for forensic ancestry estimation (42.79%), a nearly equal number of individuals responded as either neutral or agreeing to its use. This lack of consensus is significant and highlights the complexities of the interaction between linguistic, cultural, and biological indicators of identity and the indistinct categories used for the process of ancestry estimation. Despite being argued to not be an ancestry

category, rather more comparable to an ethnic group, made up of a large diverse group of individuals, it appears as a reference group in several ancestry estimation methods.

Disciplinary Differences

Bioarchaeologists and forensic anthropologists, although showing overall agreement among most statements, do show the most amount of significant differences from each other (though it must be considered that these sub-disciplines do comprise most of the respondents). Though both forensic anthropologists and bioarchaeologists generally disagreed that ancestry estimation reinforced the reification of biological races and that it should no longer be taught in academic courses, the extent of disagreement was slightly different. Forensic anthropologists were more apt to strongly disagree with these statements. Additionally, bioarchaeologists were more variable in their positions regarding whether ancestry was a social concept and forensic anthropologists were generally less favorable towards this statement. These results may stem from the increasing specialization of these fields and different training and qualifications of each (Pilloud and Passalacqua 2019; Passalacqua and Pilloud 2020), which results in differing views of the research on ancestry and its application. This being said, forensic anthropologists did not "strongly disagree" that ancestry estimation reinforced racist typologies and that ancestry estimation as a practice should end. Variation did exist in their responses to these questions and, considering recent discussions of ancestry estimation at the 2020 American Academy of Forensic Sciences meeting, and the recent emerging debate regarding the abolishment of ancestry estimation (Bethard and DiGangi 2020; Stull et al. 2020), the results of this survey seem to support this increased visibility of disagreement.

Differences among Degree Level

Some differences exist between different levels of educational attainment. Those completing their Bachelor's degree tended to score lower agreement compared to those with a Master's degree that anthropologists should interact directly with the public regarding race and ancestry. Compared to those with their PhD, those with a Master's also scored greater disagreement that concerns over ethical and moral implications result in the silencing of research (with the former also exhibiting greater variation in their opinions). Although both Master's-holding and Ph.D.-holding individuals exhibit general disagreement with the tripartite model, those with their Ph.D. generally showed more scores of "strongly disagree." Those with a Bachelor's scored agreement with "Hispanic/Latino" as a valid category for research compared to the general neutrality to disagreement among Master's-holding individuals. It appears there may be differences between educational attainment and the level of agreement regarding the amount of public interaction in which anthropologists should engage and how research should be conducted. Regarding moral and ethical issues, those with a higher degree tend towards agreeing in activism activities and public engagement, and they also tend to be less likely to show higher scores of agreement with using the tripartite scheme or "Hispanic/Latino" as an ancestry category. This may be a result of the introduction of ancestry and human variation in undergraduate work. Introduction to such topics may be cursory and early students have limited exposure to the literature and practical experience with human variation. Additionally, those earlier in their career may be more likely to be concerned about the interface between ethics, public interaction, and scientific integrity. Therefore, this may lend support to the argument for a more thorough, nuanced discussion of how ancestry works in anthropology rather than a generalized introduction that may be more inclined towards trait list discussions. Additionally, it is important for ethics and science

communication to be integrated into anthropology courses, encouraging students to be engaged in these topics.

Differences in Location of Respondent

There are some distinctions between the United States and non-U.S.-based practitioners. The United States shows slightly higher rates of agreement that there is a distinction between race and ancestry, that race is a social concept, that it is ethical for anthropologists to be engaged in social movements, and slightly higher rates of disagreement that the tripartite model of ancestry classifications is appropriate. Kazcyka and colleagues (2009) found that European biological anthropologists tended to agree that race is a biological reality, particularly in Eastern European countries. This attitude has been connected to post-WWII rises in nationalism, fueled by the intertwining of ethnic identity, land rights, and historical continuity (Turda 2010). In the United States, the history of slavery, racial injustice, colonization, and discrimination motivated cognizant change in how anthropologists conceptualized these concepts (although there is still much work to be done in these areas). Whereas, in places like Eastern Europe and China, using race as a binding element in society made it important to biologize the concept (Štrkalj 2007). However, as noted previously, only the statement that biological anthropological research is not at risk of misappropriation by white nationalist/supremacist groups or individuals was found to be significantly different between the two groups, with respondents from the U.S. showing more responses of "strongly disagree") compared to those respondents from outside of the U.S.

Comparison to Previous Survey Work

The results of this survey support earlier work by Wagner and colleagues (2017), suggesting that biological anthropologists have largely made a shift towards the view of race being an ineffective and unscientific way of understanding human biological variation. Respondents in the present study indicated ancestry was more descriptive of human biological variation. Yet, open responses indicated some respondents still referred to biological understandings of race, as was also seen by Wagner and colleagues (2017) (71% of respondents agreed "race" should be discontinued to describe groups and 71% of respondents agreed the term should be replaced with a better term). In general, the groups conceptualized by Wagner and colleagues (2017) ("straddlers," "lumpers," and "squatters") can be seen in these responses; however, the nature of the questions and the design of the current study prevent clear delineation of participants into these categories. Unlike the survey designed by Wagner and colleagues (2017), open-response questions (which were used by the other study to formulate these groups) were a limited portion of the current study.

Potentially more useful in considering the overlap between race and ancestry in biological anthropology is the concept of compartmentalization of race and slippage discussed by Nelson and colleagues (2018). According to the authors, although geneticists often conceptualized biological and social aspects of race, practitioners may "slip" between these two ideas, thereby blurring the lines. Furthermore, those who worked in a practical context were more likely to use more biological aspects of race (potentially to create a more "understandable" explanation for the public) compared to more research-based work. The same may be identified here. As previously mentioned, several respondents explained ancestry as a "soft term" for race, as a "proxy for race," or described "biological race." Despite the predominant view of anthropologists that there is a distinction between these concepts, it is evident that there remains

an overlap in some sense among some anthropologists. The nature of this overlap, however, may differ between individuals. There are anthropologists who conceptualize this distinction as a problematic nature of indistinct definitions and a persistence on the part of forensic anthropology to continue ancestry estimation, and there are anthropologists who are similar to the "straddlers" of Wagner and colleagues (2017) who perceive of race as having both biological and social components. The lack of an underlying conceptual shift concomitant with the terminological shift in biological anthropology, the nature of sample constructions, and the application of forensic research for public identification results in "slippage" of definitional distinctions between race and ancestry.

Terminology

Although the overwhelming majority of respondents argued that race and ancestry are separate, there is variability in how respondents name and describe these concepts in their open responses. For example, to describe ancestry, practitioners used this term in addition to "biological race" and "bioaffinity." Descriptions of ancestry generally included a focus on any combination of genetic, phenotypic, geographic, adaptive, biocultural, contextual, and other factors, though not necessarily consistently the same combination of these factors. Several of these aspects are highlighted by Fuentes and colleagues (2018) to describe "populations," including genetics, geographic clinal variation, phenotypic variation, environment, and evolution. In an attempt to consolidate some of these aspects of ancestry, several respondents used the term "biogeographic."

Though the AAPA has recently revised its statement on race and racism, there is no clear outline of what ancestry or population means in the context of studying human variation and the

practice of forensic ancestry estimation (Fuentes et al. 2019). According to the Scientific Working Group for Forensic Anthropology (2013), ancestry is "the geographic region and/or the ancestral region of a particular population group." According to this definition, ancestry is based on location, focusing on the geographic component. Due to ambiguities in these terms, there is also some movement within the discipline of forensic anthropology to abandon them all together. Instead, other terms such as "bioaffinity," "population affinity," and "biogeographic" are being offered in their stead. These terms are more reflective of possible similarities among individuals with similar shared population history. Therefore, these terms are more inclusive and flexible, and allow for a recognition of clinal distributions of phenotypic traits due to evolutionary forces.

The term ancestry proves incredibly difficult to define, and is considered to be genetically, phenotypically, evolutionarily, and/or geographically based. Therefore, to standardize how this concept is used and taught, it either needs to be formalized or abandoned in favor of another term or of a more nuanced way of describing human variation. Moreover, variability in interpretation and how it is taught results in greater inconsistencies between anthropologists. Particularly when ancestry is used synonymously with groups like "Hispanic/Latino," which is argued to be an ethnic group based on language (at least for "Hispanic"), ancestry becomes a more fluid concept that muddies the applied definition. This lack of standardization is further highlighted by the lack of overwhelming agreement for any preferred type of terminology for how to describe ancestral groups (i.e., social, geographic, or social/nationality). If the most common definitions provided by the respondents for ancestry involve geographic, genetic, phenotypic, and evolutionary ideas, these do not match with the social or national aspects of ancestral labels.

Respondent answers indicate significant ambiguity in preferred terminology and descriptions. A lack of rigidity has been argued to be beneficial for science, particularly for the promotion of interdisciplinary collaboration, ability to communicate with the public, and for the generation of new knowledge (Panofsky and Bliss 2017). However, these positive attributes of ambiguity do not apply to this lack of agreement on what it is that biological anthropologists study and how these topics are discussed. Panofsky and Bliss (2017) argue that the continental classification of groups results in significant ambiguity, with racial and geographic distinctions blurred. "African American" becomes simultaneously geographic and racial. When the colloquial term "Asian" is used, it begs the question as to whether or not this is being used in a geographic or racial sense. As argued by Gannett (2014), although discussed as geographic (and thus more authoritative and accurate given the apparent "removal" of any social baggage), these are simply used as stand-in terms for what has been previously called race. Furthermore, these continental divisions are not distinct and necessarily accurate; as they do not actually represent the entire geographic continent. For example, "Asian" generally refers to East Asian, "European" includes individuals residing outside of Europe and may include parts of Western Asia and Northern Africa, and "African" is confined to Sub-Saharan Africa. Further, the use of terms such as "admixed" implies an underlying assumption of "unmixed" or "pure" groups, which is problematic in studies of modern human variation as it ignores the broad overlap in many populations due to shared population histories (Gannett 2014; Passalacqua and Pilloud 2018). As Gannett (2014) argues, the interchangeability of terms means that race is implicit when using ancestry terms. Although ancestry, and the use of more geographically based terminology, has been adopted to produce a more scientific understanding of human variation; the remaining interchangeability of racial and ancestral terms, and continued use of large continental divisions

for studying human variation, indicate there is still significant overlap between the concepts of race and ancestry (Gannett 2014). Although most respondents did not agree with the statement that ancestry is a social category, the conceptualization of studying human groups along these continental boundaries, how samples are constructed (based along ancestry lines), and what factor (e.g., ancestry) is deemed important for evaluating variation has social importance and foundations (Wade 2020).

Teaching

Echoing the sentiments of Hubbard (2017a;b), additional work must be applied to effective teaching of these concepts. Students may not understand race and ancestry as concepts, due to lack of effective discussion in textbooks (Shanklin 2000; Lieberman et al. 2005; Edgar and Hunley 2009; Donovan 2015; Hunsecker 2015; Hubbard 2017a), lack of best practices for faculty when teaching these concepts (Hubbard 2017a), conflicting information, and lack of disciplinary consensus. This survey showed general agreement that race is a social and cultural construct oftentimes based on phenotypic characteristics used for the marginalization of particular groups and ancestry is a biogeographic concept identifiable through phenotypic and genotypic characteristics. Yet, there remains a variety of ways in which individuals teach race and ancestry, which results in differences in how students conceptualize these concepts. Furthermore, when teaching ancestry estimation in a forensic context, particularly in introductory classes, the ability for an instructor is limited in the time and depth that should be afforded to the topic, thereby creating a more typological, stream-lined concept of ancestry that is not reflective of the true intricacies. Though a caveat may be introduced, the student is left with simplified, and potentially dangerously misleading, information without the full context of

the process. A variety of different ways for teaching race and ancestry were presented by respondents and likely depend on the type of class and research interests of the instructor. These approaches focus on the evolution of modern human biological variation and how it may be applied for forensic ancestry estimation, the historical context in the formation of racial groups, the systemic oppression and racism, and an in-depth analysis of anthropology's relationship with race and ancestry (see Table 10).

Results indicate that of the respondents who stated that they did teach race and ancestry in their courses, introductory biological anthropology courses were the most common arenas for teaching of these concepts. These courses are typically required components of the curriculum for Anthropology programs and may fulfil General Education requirements for students outside of the program. As a result, these courses are important sources of information not only for emerging anthropologists, but university students in general, promoting critical thinking and discussion of these topics. This broader reach highlights the importance of formalizing how these concepts are taught, as well as assessing the ethical and appropriate way of teaching these concepts. Previous research has shown that even some discussion and activities relegated to a small part of the overall semester can encourage critical evaluation of race (Hubbard 2017a;b). In addition to those activities outlined by Hubbard (2017a;b), respondents in the current study proposed activities that included mixed formats of lecture and student-led discussion, highlighting specific examples of misuse including Nazi Germany, reading selected texts on the subject, using current events as a contextual background, outside activities, journal articles, rhetoric analyses, and as a part of osteological labs. Given the introductory nature of these courses, and the likelihood that students may not be anthropology majors, it is critical to make an impactful, standardized, clear, and concise way of introducing these concepts. Even if the

concepts of race and ancestry are simply introduced into course work, students must be provided the opportunity to engage with these ideas and to be afforded proper understanding of the nuances of ancestry estimation and the contentious history and nature of the process. To present simple illustrations of crania that "look like a given ancestry group" and to list a set of traits that occur most frequently in a population is too simple an introduction and easily leads to misuse.

In addition, it is important for instructors to gain training in how to conduct these discussions. Training to promote diversity in the classroom, as well as courses in handling sensitive topics, are available and should be capitalized by anthropologists. Given the direct nature of our work on the real-life experiences of individuals, it is important that we are prepared to understand how to facilitate discussions and activities, identify microaggressions perpetrated by students and instructors, and engage in self-critiques of course material and dialogue.

Public Engagement

The majority of biological anthropologists argue that it is ethical for professional anthropologists to participate in activism efforts and sociopolitical movements without worry of infringing on academic neutrality. Public engagement efforts hold importance among respondents, at least in an attempt to address misuse of research. Respondents predominantly argued there should be an effort to directly address those individuals (whether in academia or a part of the general public) who use anthropological research as a means to justify the oppression of people.

Anthropologists should investigate the primary ways in which the public come into contact with scientific information and use these avenues as their primary ways in which to engage (Llorente et al. 2019). Social media may provide an important route for reaching out to the public, particularly regarding controversial or relevant topics (Hara 2019; Howell et al.

2019). This potential has been noted by a number of individuals and organizations, as reflected by online blogs (see Price 2010 and Sheridan 2017 for lists of anthropology related blogs), the creation of an *ad hoc* Media and Communication committee by the American Association of Physical Anthropologists, podcasts (Durrani et al. 2015; Rivera 2020), and use of YouTube (Anton et al. 2018), among others (Dingwall et al. 2020). The use of new technology, including 3D printing and augmented reality have also shown potential for use in engagement efforts in classrooms and museum contexts (Brookshier et al. 2020; Forrest 2020). Archaeologists have explored the potential of using video games like *Minecraft* and *Assassin's Creed* to garner interest in archaeological sites and cultural heritage (Casey 2019; Langis-Barsetti and Ksiezak 2019; Winter 2019). These media and technology efforts, in conjunction with engaging both youth and adults in physical activities, lectures, and discussions in classrooms, non-profits, museums, after-school programs, camp series, and special workshops will assist in reaching the public through a variety of mediums, encouraging participation in science. This multi-modal approach is also important in not only accommodating diverse approaches in learning, but to also motivate discussion between different viewpoints and promote an openness to learning scientific knowledge.

Conducting public engagement activities in which participants are being "educated" or having a one-sided learning experience may prove unsuccessful for a variety of reasons. First, individuals may be scientifically literate; however, they may distrust the scientific community or may home in on perceived risks or weaknesses in a study. Second, individuals who may be told they are wrong in their beliefs or feel that they are being talked *at* rather than talked *with*, may, in fact, more ardently stand by their thinking even if it contradicts disciplinary consensus (Leshner 2003; Reiss 2009). Individuals may feel uncomfortable or even angry by the introduction of

information that conflicts with preconceived ideas of the world (e.g., Reiss 2009; Cho 2011). For example, when introducing evolution to students who believe in creationism or intelligent design, students may feel attacked and resistant to lessons (Reiss 2009). By understanding these perspectives as "worldviews" and not necessarily misinformation or ignorance, scientists are better equipped to assist students in accepting information and at least reaching a negotiation of their beliefs and scientific consensus. It is important to provide individuals with the tools to understand the science even if they do not accept official positions (Reiss 2009). The importance of a two-way dialogue and interaction between both parties is critically important to the success of public engagement efforts (Howell et al. 2019; Llorente et al. 2019). This may be promoted by using the term "public engagement" versus "public outreach." The former promotes an instructional and active process that impacts both parties and implies an equal platform, whereas "outreach" suggests an asymmetrical balance of power and information where a more privileged party is assisting an underprivileged party. Although conducted in Spain, a recent survey conducted by Llorente and colleagues (2019) highlights the importance of mutual dialogue between scientists and the public. Results of the survey of Spanish scientists, compared to public surveys conducted by the Spanish Foundation for Science and Technology (FECYT 2017), showed scientists generally believed there was low scientific understanding among the public. The authors suggest that due to this lack of understanding, there is the potential fear on the part of scientists of disparagement and misrepresentation of the science by the public, which may affect success in public engagement activities. However, the responses from the public indicated significant interest in, and appreciation of, science. The authors argue there must be efforts to bridge this disconnect between how the public and scientists view each other and how scientists engage with the public (Llorente et al. 2019).

Additionally, research has suggested the methods used in addressing science denialism may not be as efficacious when addressing the misappropriation of research, as in the case of racial extremists (Carlson and Harris 2020). There is not an active resistance to scientific information but rather an interpretation of research so as to fit racialist ideologies. Therefore, it is not only important for biological anthropologists to be prepared to confront and address misuse and misunderstanding in a public context, but to also be critical about both research design and communication, as well as understand the ways in which racial extremists use scientific studies to support their arguments (Panofsky and Donovan 2019; Carlson and Harris 2020; Panofsky et al. 2020). In particular, Panofsky and colleagues (2020) argue that researchers must be aware of how racial extremists engage with *metapolitics*, or the idea of creating cultural change to enact eventual political change (Stern 2019: 10, 23; Panofsky et al. 2020). Biological anthropologists must be aware of how the arguments and use of anthropological research by racial extremists may affect cultural and media discourse, policy discussion, and public perception of science and researchers. Public engagement efforts must not be focused only on "educating," but must thoroughly understand the ideologies, motivations, and interpretations of racial extremists (Panofsky et al. 2020). There is significant evidence for the use of biological anthropological research, to include genetics (and genetic ancestry tests), forensic anthropology, and broader dental and skeletal variation research by racial extremists in recent years (e.g., Adams and Pilloud 2018; Harmon 2018; Panofsky and Donovan 2019; Adams and Pilloud 2020; Carlson and Harris 2020; Panofsky et al. 2020). It is important for biological anthropologists to be cognizant of the types of research being used, the concepts being drawn from these publications, and the mechanisms by which racial extremists serve as gatekeepers to scientific information.

Once equipped with this information, the discipline must be cognizant of how to mitigate the risk of misuse.

The findings of a recent survey conducted by the Pew Research Center (Funk 2020) highlight the importance of engaging with the public. According to the survey, the majority of respondents (73%) see positive benefits from scientific research on society, though the results suggest there were notable differences in this attitude between degrees of scientific literacy and between individuals of different racial/ethnic groups. Only 35% of people reported a "great deal of confidence" that scientists would work for the interests of the public, compared to 51% that argued a "fair" degree of confidence, and 13% arguing for little to no confidence. Approximately 60% of respondents argued scientists should take an active role in public policy discussion, though political affiliation did have significant differences in how much trust was placed in scientists in these decision-making processes. Political affiliation also appeared to correlate with the amount of trust individuals had in the ability of the scientific method to produce objective conclusions instead of "any result a researcher wants." Approximately 63% of all respondents trusted the use of the scientific method, although Democrats tended to argue for greater trust in the scientific method and being more impacted by the extent of scientific literacy. Respondents also argued that open access to data and independent peer-review ensured greater trust in scientific results (Funk 2020).

Conclusions

The results of this survey highlighted a lack of consensus based on the application, research, and teaching of race and ancestry within biological anthropology. Differences in opinion are largely driven by sub-disciplinary focus (likely related to differences in training and education), degree

level, and age. Although there is a prominent paradigm in anthropology that ancestry is biological and race is social, there continues to be overlap in the terminology of ancestry groups with racial categories, there is disagreement as to whether ancestry in its own right is also a social category, and there is disagreement as to whether "Hispanic/Latino" is a valid ancestry category. Additionally, the ways in which respondents discussed how they presented race and ancestry in their classes indicated a range of approaches. These ranged from a complete lack of utility of both concepts, a dichotomy of the concepts, a correlation between race and ancestry, and ancestry practically equivalent to race. This lack in consensus in how these concepts are taught further propagates disagreement and variation in use in future generations of students/scholars and reflect continued disagreement among practitioners. Even when ancestry is described in opposition to race, definitions vary on the factors most important to ancestry (i.e., genetics, phenotypes, geography, and microevolutionary processes). A lack of consensus in the field translates to a lack of understanding in the public, resulting in an inability to efficiently translate and communicate these topics in an effective manner.

Based on the results of this survey, we argue for continued dialogue between individuals of different disciplinary backgrounds, degrees of education, and social identities in identifying what race and ancestry are and how these concepts should be studied and taught. Continued dialogue at conferences and in the literature are a good first step. Professional organizations are beginning to lead the charge in discussing issues of race and the role that biological anthropology has played in perpetuating the concept of biological race. These efforts need to be furthered and incorporate diverse voices. We also need to actively combat the racist origins of anthropology and lasting effects of racism in the classroom, in our discipline, and in our research. A variety of teaching modes may be utilized, including diverse representation in syllabi, classroom dialogue,

and active learning strategies. Additionally, engagement with the colonial origins of anthropology and many skeletal collections, race science, and racism and white privilege may serve to further engage students and faculty alike in addressing the complexities of race and ancestry that continues to persist in the discipline today. Recent advice by Wade (2020) is helpful for incorporation into discussing these topics in teaching, research, and public engagement. These include recognizing the social importance of "race," while simultaneously specifying that race is not biological; humanizing how we refer to individuals we study; collaborating with descendant and living communities; avoiding essentialist/typological concepts and terminology; and challenging traditional continental divisions of human variation. Given the conflict and social tensions present regarding racism, it is critical that anthropologists codify what these concepts mean and how they must be studied in a socially responsible way that helps to end racism and typology. Finally, it is important to vocally condemn the misappropriation of our work. Anthropologists largely agree in greater participation in public engagement and science communication, particularly in the context of addressing the misuse of anthropological research and spread of misinformation. These efforts must be communicated to the public through broad digital and in-person engagement activities. As anthropologists, we need to engage with the public on these topics in meaningful ways. This will not only improve science communication and disseminating anthropological consensus to the public but will also encourage the engagement of public understandings of race and ancestry in research and teaching. As discussed earlier, understanding the "worldviews" of the public regarding these topics (Reiss 2009), and how these may inform forensic anthropology is critical.

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Table 1. Survey Questions Asked Based on a Five-Point Likert Scale

Number	Question
Q1	Anthropologists have a responsibility to ensure their research is not misappropriated (i.e., misinterpreted, misused in a social context).
Q2	Anthropologists should directly address researchers conducting race science (i.e., purported research that legitimizes and validates race concepts and views the races as biologically discrete identities).
Q3	Addressing race science brings unnecessary attention to the arguments of race scientists.
Q4	Anthropologists should consider carefully the racial/ancestral terminology used when presenting research.
Q5	Research topics in biological anthropology focused on phenotypic variation are justified in using categories like "African American" or "White" when discussing populations of study.
Q6	Using categories like "African American," "European," etc. reinforce ideas of racial essentialism and biological race.
Q7	"Political correctness" (e.g., the avoidance of certain research topics, language or discussions in an attempt to not insult or marginalize various groups) is an issue in biological anthropology.
Q8	Discussions regarding terminology, especially that related to ancestry and race, are matters of "political correctness" and have no relevance in biological anthropological research.
Q9	It is important for biological anthropologists to engage in discussions regarding racial and ancestral terminology, research, and diversity in the discipline.
Q10	Research regarding phenotypic racial differences should be automatically rejected from academic journals.
Q11	Concerns over ethical and moral implications of research (e.g., photos, terminology, ancestry, etc.) result in the silencing of anthropological research.
Q12	It is ethical for anthropologists to become involved in political and social movements.
Q13	Anthropologists should interact directly with the public regarding "race" and "ancestry."
Q14	If misuse or misinterpretation of research is identified, anthropologists have a responsibility to address the problem.
Q15	Once research is published, there is no responsibility regarding its subsequent use.
Q16	Anthropologists should not teach the estimation of "ancestry" in academic courses.
Q17	There is a difference between "race" and "ancestry."

Q18	Forensic anthropologists estimate "biological race."
Q19	Forensic anthropologists are successfully able to estimate an individual's ancestry.
Q20	Forensic anthropologists should no longer estimate ancestry.
Q21	Forensic anthropologists reinforce racial typologies.
Q22	Forensic anthropological ancestry categories should be geographically based ("European," "African," "Asian," etc.).
Q23	Forensic anthropological ancestry categories should be socially based (e.g., "White," "Black," etc.).
Q24	Forensic anthropological ancestry categories should be nationality and socially based (e.g., "American White," "African American," "Asian American").
Q25	The tripartite model of ancestry classifications (i.e., Africa, Asia, Europe) is an appropriate scheme.
Q26	"Hispanic/Latino" is a valid ancestry category to use in biological anthropology research.
Q27	There is no longer a debate regarding biological racial differences.
Q28	Biological anthropology, as a discipline, should be involved in addressing the race debate.
Q29	Race is a biological concept.
Q30	Race is a social concept.
Q31	Ancestry is a social concept.
Q32	Alleged racial differences in intelligence, personality, criminality, sexuality, etc. are a result of genetics.
Q33	Alleged racial differences in intelligence, personality, criminality, sexuality, etc. are a result of environmental and social factors.
Q34	Alleged racial differences in intelligence, personality, criminality, sexuality, etc. are a result of genes, environment, and culture.
Q35	There are racial disparities in intelligence.
Q36	Biological anthropological research is not at risk of misappropriation by white nationalist/supremacist groups or individuals.
Q37	Biological anthropologists should address white nationalists/supremacists when research is being used to enforce their ideologies.
Q38	Addressing white nationalists/supremacists is overstepping the neutrality researchers should maintain.

Table 2. Questions Asked Concerning Teaching about "Race" and "Ancestry"

Number	Question
Q1	How long do you teach concepts of race and ancestry in courses?
Q2	In which courses do you teach about race and ancestry?
Q3	Do you discuss issues of racism, white privilege, and white supremacism/nationalism in your courses?
Q3a	If yes, how?
Q4	Do you differentiate between "race" and "ancestry" in courses?
Q4a	If yes, how?

Table 3. Reported Sample Demographic Information from Respondents

Category	n	%
Education Degree		
Completing Bachelor's	22	8.63
Bachelor's	35	13.73
Masters	86	33.73
Ph.D.	112	43.92
Sub-discipline		
Bioarchaeology	107	41.96
Forensic anthropology	74	29.02
Medical anthropology	6	2.35
Anatomy	5	1.96
Paleoanthropology	16	6.27
Primatology	2	0.78
Archaeology	5	1.96
Dental Anthropology	8	3.14
Anthropological Genetics	3	1.18
Other	29	11.4
Racial/Ethnic		
American Indian/Native American	1	0.39
Asian/Asian American	9	3.53
Black/African American	4	1.57
Latina/x/o/Chicana/x/o	18	7.06
Middle Eastern	2	0.78
South Asian	1	0.39
White/European American	188	73.73
Multiple	18	7.06
Race not listed	11	4.31
Not provided	3	1.18
Age		
18-29 years	111	43.53
30-39 years	64	25.10
40-49 years	40	15.69
50-84 years	40	15.69
Gender		
Man	57	22.35
Woman	196	76.86
Nonbinary	2	0.78

Location		
Within the U.S.	193	75.69
Outside the U.S.	62	24.31

Table 4. Summary Survey Results

See Table 1 for questions and their corresponding number. Dark orange indicates strong 0-20% agreement, light orange indicates 21-40% agreement, white indicates 41-60% agreement, light purple indicates 61-80% agreement, and dark purple indicates 81-100% agreement.

Number	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	n
Q1	0.00%	1.18%	6.27%	25.88%	66.67%	255
Q2	1.58%	0.40%	11.46%	31.23%	55.34%	254
Q3	18.65%	42.06%	26.19%	11.90%	1.19%	252
Q4	75.10%	20.16%	2.77%	1.58%	0.40%	253
Q5	8.33%	26.98%	32.14%	27.78%	4.76%	252
Q6	4.84%	25.00%	31.05%	29.84%	9.27%	248
Q7	5.71%	22.04%	26.12%	33.06%	13.06%	245
Q8	46.91%	44.03%	5.76%	2.06%	1.23%	243
Q9	0.00%	0.82%	5.35%	25.10%	68.72%	243
Q10	20.25%	35.95%	30.17%	8.68%	4.96%	242
Q11	8.82%	35.29%	33.61%	16.39%	5.88%	238
Q12	2.98%	2.13%	25.53%	35.74%	33.62%	235
Q13	0.00%	1.28%	15.38%	40.60%	42.74%	234
Q14	0.00%	1.28%	3.85%	34.62%	60.26%	234
Q15	34.76%	45.06%	12.45%	6.87%	0.86%	233
Q16	28.70%	45.65%	17.39%	5.22%	3.04%	230
Q17	0.86%	4.31%	5.17%	35.34%	54.31%	232
Q18	30.57%	33.62%	13.97%	19.21%	2.62%	229
Q19	5.22%	22.17%	25.65%	39.57%	7.39%	230
Q20	23.58%	48.03%	16.59%	7.42%	4.37%	229
Q21	10.92%	31.00%	30.13%	21.40%	6.55%	229
Q22	3.96%	11.89%	29.52%	41.41%	13.22%	227
Q23	29.65%	36.73%	23.89%	8.41%	1.33%	226
Q24	14.73%	27.68%	33.04%	18.75%	5.80%	224
Q25	22.77%	40.63%	20.54%	12.95%	3.13%	224
Q26	18.02%	24.77%	31.53%	23.42%	2.25%	222
Q27	40.27%	41.63%	9.50%	4.98%	3.62%	221
Q28	1.35%	2.69%	9.87%	43.95%	42.15%	223
Q29	57.21%	25.23%	8.56%	5.41%	3.60%	222

Q30	0.45%	3.59%	5.38%	33.63%	56.95%	223
Q31	14.48%	34.84%	22.62%	22.17%	5.88%	221
Q32	71.17%	15.32%	11.26%	1.80%	0.45%	222
Q33	3.17%	5.88%	17.65%	42.08%	31.22%	221
Q34	8.60%	14.93%	25.79%	35.29%	15.38%	221
Q35	66.97%	20.36%	7.69%	2.71%	2.26%	221
Q36	51.82%	34.09%	9.09%	4.09%	0.91%	220
Q37	3.17%	3.62%	8.60%	33.03%	51.58%	221
Q38	39.09%	38.64%	10.91%	9.55%	1.82%	220

Table 5. Statistically Significant Pairwise Differences between Disciplines for Questions Asked

Positive z-scores indicate the first object of the pair had stronger agreement scores. Negative z-scores indicate the first object had strong disagreement scores.

Question	Pair	Z-score	Median	Mode	IQ1-IQ3	p-value
Q5: Research topics in biological anthropology focused on phenotypic variation are justified in using categories like "African American" and "White" when discussing populations of study.	Bioarchaeology	-3.897	3	2	2-3	0.002‡
	Forensic anthropology		4	4	3-4	
Q9: It is important for biological anthropologists to engage in discussions regarding racial and ancestral terminology, research, and diversity in the discipline.	Bioarchaeology	3.405	5	5	4-5	0.015‡
	Paleoanthropology		4	5	3-5	
Q9: It is important for biological anthropologists to engage in discussions regarding racial and ancestral terminology, research, and diversity in the discipline.	Forensic anthropology	3.786	5	5	5-5	0.003‡
	Paleoanthropology		4	5	3-5	
Q16: Anthropologists should not teach the estimation of "ancestry" in academic courses.	Bioarchaeology	4.213	2	2	2-3	0.001‡
	Forensic anthropology		2	2	1-2	
Q19: Forensic anthropologists are successfully able to estimate an individual's ancestry.	Bioarchaeology	-4.868	3	3	2-4	0.000‡
	Forensic anthropology		4	4	3-4	

Q20: Forensic anthropologists should no longer estimate ancestry.	Bioarchaeology	3.618	2	2	2-3	0.007‡
	Forensic anthropology		2	2	1-2	
Q21: Forensic anthropologists reinforce racial typologies.	Bioarchaeology	3.487	3	3	2-4	0.011‡
	Forensic anthropology		2	2	2-3	
Q31: Ancestry is a social concept.	Bioarchaeology	3.430	3	2	2-4	0.014‡
	Forensic anthropology		2	2	2-3	

‡ Indicates statistical significance at the Hochberg p-adjustment level

Table 6. Statistically Significant Pairwise Differences between Educational Categories for Questions Asked

Positive z-scores indicate the first object of the pair had stronger agreement scores. Negative z-scores indicate the first object had stronger disagreement scores.

Question	Pair	Z-score	Median	Mode	IQ1-IQ3	p-value
Q11: Concerns over ethical and moral implications of research (e.g., photos, terminology, ancestry, etc.) result in the silencing of anthropological research.	Masters	-2.678	2	2	2-3	0.022‡
	Ph.D.		3	2	2-4	
Q13: Anthropologists should interact directly with the public regarding "race" and "ancestry."	Completing Bachelor's	-3.125	4	4	3-4	0.005‡
	Masters		4	5	4-5	
Q13: Anthropologists should interact directly with the public regarding "race" and "ancestry."	Completing Bachelor's	-2.820	4	4	3-4	0.012‡
	Ph.D.		4	5	4-5	
Q25: The tripartite model of ancestry classifications (i.e., Africa, Asia, Europe) is an appropriate scheme.	Master's	2.816	2	2	2-3	0.015‡
	Ph.D.		2	2	1-3	
Q26: "Hispanic/Latino" is a valid category to use in biological anthropology research.	Bachelor's	2.745	4	4	2-4	0.018‡
	Masters		2	3	2-3	

‡ indicates statistical significance at the Hochberg p-adjustment level

Table 7. Statistically Significant Pairwise Differences between Location of Respondents for Questions Asked

Positive z-scores indicate the first object of the pair had stronger agreement scores. Negative z-scores indicate the first object had strong disagreement scores.

Question	Pair	W	Median	Mode	IQ1-IQ3	p-value
Q3: Addressing race brings unnecessary attention to the arguments of race science.	Within U.S.	4958	2	2	2-3	0.943*
	Outside U.S.		2	2	2-3	
Q9: It is important for biological anthropologists to engage in discussions regarding racial and ancestral terminology, research, and diversity in the discipline.	Within U.S.	6310	5	5	4-5	0.626*
	Outside U.S.		5	5	4-5	
Q12: It is ethical for anthropologists to become involved in political and social movements.	Within U.S.	6473	4	4	3.5-5	0.060*
	Outside U.S.		4	3	3-4	
Q14: If misuse or misinterpretation of research is identified, anthropologists have a responsibility to address the problem.	Within U.S.	6144	5	5	4-5	0.142*
	Outside U.S.		4	4	4-5	
Q17: There is a difference between "race" and "ancestry."	Within U.S.	6172	5	5	4-5	0.053*
	Outside U.S.		4	4	4-5	
Q18: Forensic anthropologists estimate "biological race."	Within U.S.	3932.5	2	2	1.75-3	0.943*
	Outside U.S.		2	2	2-3	
Q25: The tripartite model of ancestry classifications (i.e., Africa, Asia, Europe) is an appropriate scheme.	Within U.S.	3660	2	2	1.5-3	0.449*
	Outside U.S.		3	2	2-4	
	Within U.S.	5509.5	4	5	4-5	0.603*

Q28: Biological anthropology, as a discipline, should be involved in addressing the race debate.	Outside U.S.		4	4	4-5	
Q30: Race is a social concept.	Within U.S.	5499.5	5	5	4-5	0.540*
	Outside U.S.		4	5	4-5	
Q36: Biological anthropological research is not at risk of misappropriation by white nationalist/supremacist groups or individuals.	Within U.S.	3346	1	1	1-2	0.049*‡
	Outside U.S.		2	2	1-2	
Q38: Addressing white nationalists/supremacists is overstepping the neutrality researchers should maintain.	Within U.S.	3580.5	2	1	1-2	0.580*
	Outside U.S.		2	2	1-4	

* indicates statistical significance at the 0.05, unadjusted level

‡ indicates statistical significance at the Hochberg p-adjustment level

Table 8. Statistically Significant Pairwise Differences between Age Categories for

Questions Asked

Positive z-scores indicate the first object of the pair had stronger agreement scores. Negative z-scores indicate the first object had strong disagreement scores.

Question	Pair	Z-score	Median	Mode	IQ1-IQ3	p-value
Q11: Concerns over ethical and moral implications of research (e.g., photos, terminology, ancestry, etc.) result in the silencing of anthropological research.	18-29 years	-2.900	3	3	2-3	0.011‡
	50-84 years		3	2	2-4	
Q30: Race is a social concept.	18-29 years	3.334	5	5	4-5	0.003‡
	50-84 years		4	4	4-5	

Table 9. Statistically Significant Pairwise Differences between Gender Categories for

Questions Asked

Positive z-scores indicate the first object of the pair had stronger agreement scores. Negative z-scores indicate the first object had strong disagreement scores.

Question	Pair	Z-score	Median	Mode	IQ1-IQ3	p-value
Q24: Forensic anthropological ancestry categories should be nationality and socially based (e.g., "American White," "African American," "Asian American").	Man	-2.423	2	2	2-3	0.023
	Woman		3	3	2-4	

Table 10. Main Themes of How "Race" and "Ancestry" Are Taught

Human Variation	Historical Context	White Privilege	History of Anthropology	Cultural Context
Patterns of human variation	Colonialism/ Colonization	Affects perceptions of racial categories	Overview of the history of the field	Cultural construction of race
"Biologizing" of race (e.g., growth and development, nutrition, "racial" diseases/medicine)	Medicine and anatomy practices (e.g., white male as the archetype)	Role in science production (e.g., medicine, skeletal biology pre-NAGPRA, ancestry estimation)	Eugenics/race science	Ethnocentrism
Morphological variation	Specific examples (e.g., Third Reich – Final Solution)	Intersectionality	Misappropriation of biological anthropology	Social movements
Evolution of phenotypic differences often used to distinguish racial groups (e.g., skin color or folate deficiency)	Western classification systems – origin of modern racial concepts	White fragility	Development and demographic composition of skeletal collections	Subjugation, oppression, and genocide of indigenous peoples
Ancestry estimation	Institutionalized/ systemic/structural racism, discrimination	Relation to historical development of racism and current political atmosphere	Racism's and colonialism's impact on anthropology's development/racist theories	Non-existence of race
Benefits of human variation (e.g., survivability)	Racial "admixture"	White supremacism in modern concepts of biological and social race	Racial typologies	Structural violence and institutional racism
		Impact of privilege on everyday job performance, identification	Ancestry assessment	Desire to categorize

			Anthropological research is influenced by sociopolitical contexts	Social, political, and economic impacts on racial groups
			Lack of diversity in biological anthropology	
			Ethics	
			Rhetoric in science and politics	

Supplementary Table S1. Mann-Whitney *U*-test, Kruskall-Wallis, and Post Hoc Test Results for Survey Responses, by Subdiscipline, Degree Attainment, Location, Age, Race, and Gender

[Note: Please refer to supplemental Excel file.]

Figure 1.