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TECHNICAL NOTE

ANTHROPOLOGY

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Current Practices by Forensic Anthropologists in Adult Skeletal Age Estimation*

ABSTRACT: When determining an age estimate from adult skeletal remains, forensic anthropologists face a series of methodological choices. These decisions, such as which skeletal region to evaluate, which methods to apply, what statistical information to use, and how to combine information from multiple methods, ultimately impacts the final reported age estimate. In this study, a questionnaire was administered to 145 forensic anthropologists, documenting current trends in adult age at death estimation procedures used throughout the field. Results indicate that the Suchey-Brooks pubic symphysis method (1990) remains the most highly favored aging technique, with cranial sutures and dental wear being the least preferred, regardless of experience. The majority of respondents stated that they vary their skeletal age estimate process case-by-case and ultimately present to officials both a narrow and broad possible age range. Overall, respondents displayed a very high degree of variation in how they generate their age estimates, and indicated that experience and expertise play a large role in skeletal age estimates.

KEYWORDS: forensic science, forensic anthropology, age at death estimation, aging methods, *Daubert* criteria, pubic symphysis, trends

Determining an accurate estimation of age at death from unknown adult skeletal remains continues to be a challenging responsibility of skeletal biologists (1,2). As the discipline of forensic anthropology continues to advance as a science it is crucial to be aware not only of one's own methodological decisions, but how these decisions are being made throughout the field. This is a difficult task when different skeletal regions may be used to estimate age and numerous aging methods for the same skeletal region/s are available. Each method may provide different forms of phases, mean ages, age ranges, standard deviations, or standard errors that may be used to produce an age estimate. Many of these methods have been developed or tested on distinct temporal and geographic skeletal samples resulting in inconsistent reports of accuracy and reliability or tendencies to over- or underestimate certain age groups. Furthermore, there is no standardized way of combining information from multiple age estimation methods into a final age range to report to officials.

Each of these methodological decisions could lead two experienced forensic anthropologists to slightly different age estimates. Even if both estimates include the true age, questions regarding replicability and methodological choices could be raised in a court of law, especially in light of the *Daubert* challenge (3,4) and the recent National Academy of Science report (5).

Given the variation of preferred skeletal aging methods and the lack of standardization of the age estimation process, the authors were interested in understanding how forensic practitioners determine a final age estimate. A questionnaire was developed to explore whether there is a universal set of methods used by all forensic anthropologists, or if methodological preferences are unique to each practitioner. Areas investigated by the study included: which skeletal regions and age estimation studies are most popular; are the standard deviations, standard errors, age ranges, or means used when considering the possible age estimate of the deceased; how are the results from multiple methods incorporated into a final age estimate; how are discrepancies between two methods resolved; and finally, how much does personal experience weigh into these decisions?

The goal of this study was to document the current adult age estimation procedures practiced by forensic anthropologists throughout the field. By reporting these results, we hope to raise awareness of our practices as a unified discipline and promote discussion on future improvements and standardization in adult age estimation.

Methods

An electronic questionnaire was developed through the use of an online survey application (6) to blindly collect information regarding forensic anthropological experience, preferred skeletal aging techniques, and methods used in producing a final age estimate. It consisted of *c.* 20 questions, requiring about 15 min to complete. To facilitate comparisons, the authors aimed to format all survey questions as multiple choice responses. In many cases, however, the extensive variety of methodological options made including all possibilities infeasible. Therefore, the authors included the responses expected to be most popular, allowed participants to mark multiple answers when relevant, and encouraged additional written comments following each question. The questionnaire was distributed electronically to all members of the Physical Anthropology section of the American Association of Forensic Sciences (AAFS). Prior Institutional Review Board approval was obtained by the affiliated university of each author. The responses were

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completely anonymous, without collection of any identifiable information, such as IP addresses or academic affiliations.

This study reports the results of 145 received questionnaire responses. Although geographic location and career titles were not collected as part of the questionnaire, given the AAFS Physical Anthropology Section membership requirements and demographics, obtained results are assumed to represent individuals primarily involved in the North American forensic anthropology community. The survey questions were specifically directed at participation in *forensic* casework and the majority of respondents reported obtaining a degree in either forensic or biological/physical anthropology. Those that reported obtaining a degree in disciplines outside of forensic and biological anthropology (e.g., anatomy, skeletal biology, osteoarchaeology, biology), nevertheless reported a high degree of forensic anthropology involvement (e.g., years of experience, caseload, and membership in AAFS), and therefore were included in the study. To determine if respondent experience played a significant role in participant responses, Spearman rank correlations and logistic regressions (SPSS 16.0; SPSS Inc., Chicago, IL) were used when appropriate.

Results

Questions 1–4. Experience

Of the 145 respondents, 44.8% had completed their doctorate and 37.9% their master's degree (Table 1); 15.1% of individuals obtained a degree specifically with "forensic anthropology" in the title. An additional 7% obtained a degree in general anthropology or biological/physical anthropology with a concentration in forensic anthropology. The majority of participants, 55.1%, obtained a degree in biological or physical anthropology (45.6% and 9.5%, respectively).

When asked to report the number of forensic anthropology cases in which respondents participated in constructing a biological profile, the highest percentage of individuals (38.6%) reported working over 50 cases in their career. On the other hand, 40.7% reported having only up to 5 years of experience. To investigate the relationship between degree obtained, years of experience, and number of cases worked, the three variables were plotted against each other (Figs 1–3). As expected, the individuals with the highest degrees and years of experience are responsible for the majority of caseloads. Spearman rank correlations between all the variables were significant ($p < 0.001$).

Questions 5–7. Skeletal Region Preferences

On a 1–5 scale, participants were asked to rank the pubic symphysis, sternal rib ends, auricular surface, cranial sutures, and dental wear according to their personal preference and reliability in adult age at death estimation, with 1 being the most and 5 being the least preferred and reliable (Table 2). The survey program randomized the order of the presented skeletal regions during each response to remove any biases. Seventy-eight percent of respondents marked the pubic symphysis as the most preferred region, resulting in an average rank of 1.28. Sternal rib ends and the auricular surface obtained an average ranking of 2.45 and 2.71, respectively. Cranial sutures and dental wear were the least preferred skeletal regions,

TABLE 1—*Highest degree obtained by respondents.*

Degree	*n*	%
MD	3	2.1
PhD	65	44.8
MA/MS	55	37.9
BA/BS	19	13.1
Current undergraduate	3	2.1
Total	145	100

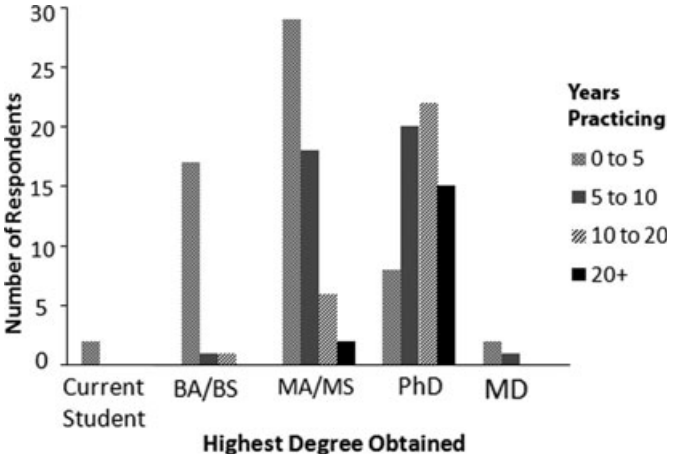

FIG. 1—*The relationship between number of years of experience and highest degree obtained by respondents* (r = *0.5104,* p < *0.001).*

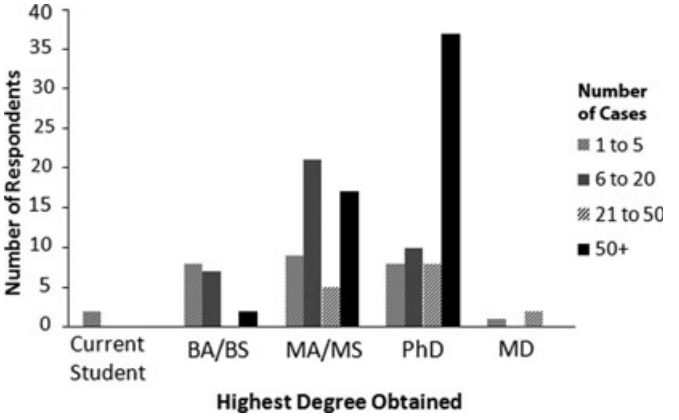

FIG. 2—*The relationship between case experience and highest degree obtained by respondents* (r = *0.358,* p < *0.001).*

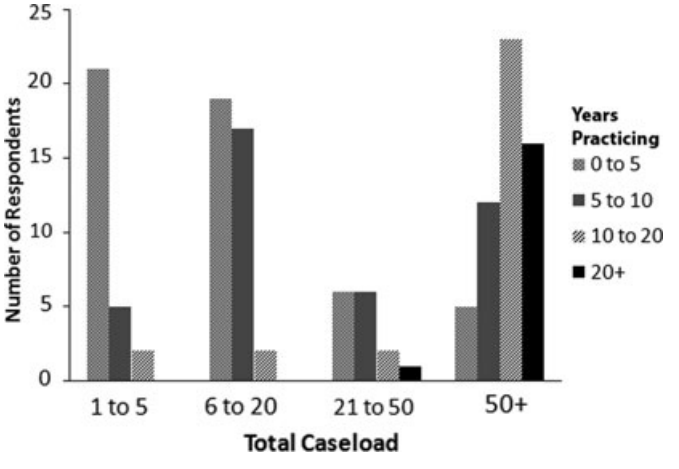

FIG. 3—*The relationship between years of experience and case experience of respondents* (r = *0.6716,* p < *0.001).*

TABLE 2—*Ranked preference of skeletal region in adult age estimation.*

Answer Options	1	2	3	4	5	Average Rank	*n*
Pubic symphysis	103	23	4	2	0	1.28	132
Sternal rib ends	16	63	38	10	6	2.45	133
Auricular surface	9	42	61	14	4	2.71	130
Cranial sutures	0	3	11	57	58	4.32	129
Dental wear	4	1	14	46	65	4.28	130

Question presented: please rank the following skeletal regions according to your personal preference and their reliability in adult age at death estimation, with 1 being the most, and 5 being the least preferred and reliable.

TABLE 3—*Ranked preference of skeletal region in adult age estimation by respondent's years of experience.*

	Average Rank by Years of Experience			
Answer Options	0–5	5–10	10–20	20+
Pubic symphysis	1.11	1.30	1.57	1.29
Sternal rib ends	2.52	2.51	2.29	2.37
Auricular surface	2.71	2.75	2.5	3
Cranial sutures	4.32	4.31	4.37	4.23
Dental wear	4.35	4.25	4.33	4.07

As in Table 2, the lower the average ranking score, the greater the preference for the skeletal region.

TABLE 4—*Percentage of respondents reportedly utilizing each method.*

Pubic symphysis	
95.3%	Suchey-Brooks Method (7–13)
27.9%	Todd Phase Method (14,15)
28.7%	McKern & Stewart Component (16)
18.6%	Gilbert & McKern 3-Component (17)
0.8%	Ascadi & Nemeskeri (39)
1.6%	Don't typically use
5.4%	Other
Auricular surface	
39.5%	Buckberry & Chamberlain (21)
84.5%	Lovejoy et al. (20)
3.9%	Osborne et al. (22)
7.8%	Don't typically use
10.9%	Other
Sternal rib ends	
89.9%	İşcan et al. Method (23–27)
1.6%	DiGangi et al. (28)
7.8%	Don't typically use
4.7%	Other
Cranial sutures	
61.2%	Meindl & Lovejoy (18)
7.0%	Nawrocki (19)
38.8%	Don't typically use
11.6%	Other

Question presented: mark all of the following methods/resources you typically use when compiling and adult age at death estimate (mark all that apply).

resulting in an average value of 4.3. Other popular responses noted in the comments section included: quality of bone, evidence of arthritis in joints and vertebrae, medial clavicle fusion, histology, maxillary suture fusion, tooth root translucency, and cementum annuli.

To investigate the role of experience in skeletal region preference, average ranking scores were also calculated for each experience category (Table 3). Regardless of experience, the pubic symphysis was always the most preferred, followed by the sternal rib ends and auricular surface. The only difference in the pattern of skeletal region preference between experience categories was that the least experienced group (0–5 years) ranked cranial sutures slightly higher than dental wear patterns (a difference in average ranks of only 0.03).

Comments on reliable, yet under-used, skeletal regions/methods were similarly variable. The most popular response, however, was "histology." Many individuals justified histology's under-use by noting that it is destructive and requires training, experience, and equipment. Another respondent stated they could not answer which methods were under-used because they were "not familiar with the practices of other anthropologists," hence validating the need for this study.

Questions 8–13. Study and Resource Preferences

For each of the traditional skeletal aging traits, participants were asked to mark the studies/methods and resources which they *typically* use. Multiple answers were accepted and blanks were provided for participants to write in any studies not included (Table 4).

Pubic Symphysis—The Suchey-Brooks method (7–13) was by far the most popular with over 95% of respondents utilizing the method. The earlier methods by Todd (14,15), McKern and Stewart (16), and Gilbert and McKern (17), however, are still moderately popular. Spearman rank correlations and logistic regression results indicate no significant relationships between preferred methods and number of years experience or cases completed ($p > 0.05$). Casts (72.1%), photographs (53.5%), example drawings (48.8%), and written descriptions (69.8%) were all popular resources utilized by participants, and as illustrated by their high percentages, are used in combination.

Cranial Sutures—Cranial sutures were reportedly used by 61.2% of respondents. All of the respondents marked typically using the Meindl and Lovejoy (18) method, and 7% of respondents also noted using the revised method by Nawrocki (19). Many commented, however, that they use age estimates from cranial sutures cautiously and rely on them only when other age indicators are not available.

Auricular Surface—The auricular surface was reportedly used by 92.2% of respondents. Of the total respondents 84.5% typically use the Lovejoy et al. method (20). The Buckberry and Chamberlain method (21) was reported to be used by 39.5% of individuals and the Osborne et al. method (22) by 3.9%. Given the percentage numbers, as well as comments provided by participants, it is apparent that many anthropologists will use more than one method for the auricular surface, comparing the results obtained from each. Interestingly, a logistic regression suggested years of experience was a significant predictor of individuals who reported not typically using the auricular surface ($\chi^2 = 8.917$, d.f. = 3, $p = 0.030$), with those individuals with more experience choosing more frequently to *not* use the auricular surface.

Sternal Rib Ends—As in the auricular surface, 92.2% reported typically using the sternal rib ends. Besides the İşcan et al. method (23–27), the DiGangi et al. (28) method was also mentioned for use analyzing the first rib ends.

Literature Sources—In all of the above-mentioned traditional adult skeletal aging traits the original studies from the 1980s remain the most popular, while the most recent studies were the

least utilized. With regards to additional materials, written descriptions, photographs, and casts were highly favored and used in conjunction with all traits. Example drawings, however, were relatively less favored in all cases.

Among the majority of respondents, 78.9%, refer to the original publications during analysis, 62.5% refer to "Standards for Data Collection from Human Skeletal Remains" (29). The 17.2% who selected "Other" included sources such as Bass (30), Byers (31), White and Folkens (32), Reichs (33), Moore-Jansen et al. (34), and less publicized sources such as "cast descriptions," "own raw data," and "Human ID Lab Manual—UT publication."

When asked if participants were familiar with any more recent publications evaluating or presenting new standards to the above-mentioned skeletal methods, the 31 positive responses were extremely variable. One participant commented that "Because the others [original studies] are conveniently located in a single publication (Standards) I more typically use the ones I have listed. This is also because I have more experience with them and haven't yet sat down to really learn the systems laid out in the new articles, nor have I heard that they are significantly better from colleagues."

Questions 14–19. Use of Statistical Information to Provide Age Estimates

Information from a Single Study—The majority of participants reported using sex (91.1%) and ancestry (60.2%) specific age-ranges when available. When confronted with inconsistent age estimates from the left and right sides, most anthropologists (68.6% of respondents) take the average. The second most favored response was to consistently use the left side (16.3%), followed by using the youngest side (8.1%) and oldest side (5.8%).

Participants were asked what age estimation information they typically use from a single study. As demonstrated in Table 5, results were highly variable. The most popular information used in obtaining an age estimate, was the range provided by the studies. However, experience and expertise was the second most popular response.

All but one respondent reported using information from multiple phases, when necessary (either because a trait had characteristics intermediate of both consecutive phases or to increase the narrow age ranges provided by each phase). When asked how they combine the information from neighboring phases, however, responses were much less consistent (Table 6). Popular resolutions are the use of the overlap of the two phases, or the entire range spanned by both. Once again, however, many individuals rely on their experience and expertise to narrow or expand the age estimate as necessary. Logistic regression results suggest that when using information from a single study and when combining information from multiple phases, individuals with the most years of experience were more likely to report using their experience and expertise ($\chi^2 = 17.742$, d.f. = 3, $p < 0.000$ and $\chi^2 = 8.984$, d.f. = 3, $p = 0.030$, respectively).

TABLE 5—*Statistical information participants utilize in age estimation from a single study.*

Answer Options	Count	%
I use the range presented by the method	79	62.2
I use my experience and expertise to produce an age range I feel appropriate	55	43.3
I use the mean age presented by the method	41	32.3
I use ± two standard deviations presented by the method	39	30.7
I use ± a single standard deviation presented by the method	30	23.6
Other (please specify)	29	22.8
I use ± two standard errors presented by the method	17	13.4
I use ± a single standard error presented by the method	11	8.7
Total response count	127	N/A

Question presented: how do you determine an age range once you score a skeletal trait to be of a certain phase/category/component (check all that apply)?

TABLE 6—*Methods in combining multiple phases/categories from a single study.*

Answer Options	Count	%
I use my experience and expertise to produce an age range I feel appropriate	57	45.2
I use the overlap of the ages between the phases/categories	54	42.9
I use the entire range of both/all phases	53	42.1
Other (please specify)	28	22.2
I use the entire spread of ± a single standard deviation of both/all phases	13	10.3
I use the entire spread of ± two standard deviations of both/all phases	13	10.3
I average the phase/category mean ages	8	6.3
I use the entire spread of ± two standard errors of both/all phases	6	4.8
I use the entire spread of ± a single standard error of both/all phases	3	2.4
Total response count	126	N/A

Question presented: how would you combine information from multiple phases/categories from a single method (e.g., pubic symphysis displays characteristics of both phase 3 and 4)?

Combining Information from Multiple Regions/Studies—Participants were asked how they typically combine information from multiple age indicators/regions into a final age estimate to report to officials (Table 7). As before, numerous options were provided as well as comment space to write in responses, and because many of these methodological options are not mutually exclusive, multiple answers were allowed. Results were extremely variable and none of the methodological choices were preferred by even half of the respondents; 41.9% of participants noted that they "determine an age range on the basis of their experience, the results, and an overall gestalt of the remains." As before, logistic regression results suggests a positive relationship between use of experience and years of experience in the field ($\chi^2 = 11.313$, d.f. = 3, $p = 0.010$). A large percentage of anthropologists also acknowledge the need to vary their method on a case-by-case manner and that different methods are more accurate for different age groups; 39.5% report both a narrow ("most likely") and broad age range to officials. The most popular *objective* combination technique was to use the age range where the various methods overlap (or taking "the highest minimum and lowest maximum" as a number of respondents pointed out was taught to them by Ellis Kerley). Finally, over 25% report that they use a multifactorial approach. When asked to name the specific multifactorial method utilized only 12 mentioned transition analysis (six specifically noting Boldsen et al.'s ADBOU program [1]), two reported using an iterative Bayesian approach, and one reported using the Summary Age Technique (35).

Q20. Participant Comments

A number of participants acknowledged that combining information from various aging techniques remains a problem in forensic anthropology, and that techniques typically employed are often statistically invalid. A number of other participants expressed the need

TABLE 7—*Methods used in combining information from multiple methods into a final age estimate.*

%	Answer Options
41.9	I determine an age range on the basis of my experience, the results, and an overall ''gestalt'' of the remains
40.3	I vary my methods of determining the estimated age at death range on a case-by-case manner
39.5	I provide a narrow and broad age range
36.3	I use the ages where the age ranges of the various methods overlap
26.6	I use the estimates from various techniques depending on whether the remains appear to be from a young, middle-aged, or older adult
25.8	I use a multifactorial approach
24.2	I use the age range from the method I feel is most reliable
24.2	I use the most consistent age estimates, disregarding any method that appears to be an outlier
16.9	I take the entire range from all methods combined
12.9	I take the range of the mean ages
11.3	I round the overall estimates to the nearest multiple of 5 (e.g., if you received 33–47, you report 35–50)
11.3	Other (please specify)
9.7	I use the age ranges where the two standard deviations of the methods overlap
8.9	I average the mean ages and assign a range that I feel appropriate
8.9	I use transition analysis
8.1	I use the age range where the single standard deviations of the methods overlap
8.1	I round the overall estimates to the nearest multiple of 10 (e.g., if you received 33–47, you report 30–50)
4.8	I use the age range where the two standard errors of the methods overlap
2.4	I use the age range where the single standard errors of the methods overlap

Question presented: given a complete adult skeleton, how would you determine a final age estimate/range to present in your case report from multiple skeletal regions/methods (check all that apply)?

to use experience and confidence with techniques to narrow or expand age ranges because of these statistical issues or because of the large ranges obtained when statistical methods are employed. The following anonymous quotes are provided because they validate concerns in adult age estimation methods, support the results of this survey, and represent the voices of colleagues throughout the field:

> This is a problem in forensic anthropology. Combining the results of various age techniques is difficult and is usually performed in a statistically invalid manner.
>
> There is not really (currently) a statistically valid method for combining age estimates from multiple methods, so the method used to combine them are somewhat arbitrary, but I give more weight to methods I feel are more reliable.
>
> I typically use whatever information is available from the utilized method(s) … in order to report my final age range, which is ultimately based on my experiences and confidence with the techniques I used.
>
> Most anthropologists are weak statisticians in my experience and few can explain the difference between standard error and standard deviation, or the difference between a confidence interval and a prediction interval.
>
> … because some techniques produce ranges so large they are useless.
>
> …a general impression may make me expand or narrow the range based on a combination of factors that I know to take into consideration.

Discussion

The academic demographics of survey respondents suggest that practicing forensic anthropologists come from varied backgrounds. While over 55% of participants obtained a degree in physical/biological anthropology, only 15% obtained a degree specifically in forensic anthropology, or a total of 21.8% if other degrees with concentrations in forensic anthropology are included. This may reflect the availability of academic programs specific to forensic anthropology as well as the traditional position of forensic anthropology as a subdiscipline of physical/biological anthropology. Some may assume that a graduate degree in physical/biological anthropology would include the skills necessary to practice forensic anthropology (i.e., construction of a biological profile). While some programs may indeed meet all forensic anthropological requirements, such a degree does not *necessarily* promise any specific training in areas such as trauma and taphonomic interpretations, forensic scene recovery, maceration/processing, or legal considerations which are necessary when confronting forensic casework. This concern increases when considering the other graduate degrees listed by participants who indicated a high degree of participation in forensic casework. These reported degrees ranged from relevant disciplines, such as anatomy, general anthropology, and osteoarchaeology, to broader doctoral degrees in biology or zoology. Currently there is no accepted certification to practice forensic anthropology other than the American Board of Forensic Anthropology (ABFA). While this will likely change with the advent of the Scientific Working Group for Anthropology (SWGANTH) or other similar organizations, a practical certification for individuals who do not yet qualify to sit for the ABFA exams has yet to be implemented.

Questions regarding skeletal regions and method preferences revealed that the Suchey-Brooks pubic symphysis method (7–13) was the most popular, while individual preferences for sternal rib ends and auricular surface methods were more variable. Cranial sutures were least preferred and mainly used by forensic anthropologists only when postcranial material is not available. While more recent studies reevaluating or modifying these traditional aging techniques are available, respondents continue to prefer the original studies. As mentioned by some participants, this is likely due to familiarity with the original studies. These are the methods used by academic professors and therefore the knowledge passed on to their students. While new methods are continuously being reported in journals, they lack the 20+ years of validation studies which these traditional studies have used to build their reputation. These traditional methods are also the ones replicated in other sources, such as ''Standards'' (29), ''Essentials of Forensic Anthropology'' (36), or ''The Human Skeleton in Forensic Medicine'' (37) where

forensic anthropologists can find the resources they need for multiple skeletal regions in one convenient publication.

This survey found that besides the original articles, "Standards" (29) was also a highly popular literature source. While summaries of aging methods and compilations of methods into single volumes are useful, any modifications in the information or manner that it is replicated could result in different interpretations and age estimates. Between different sources one may find different photographs, drawings, written descriptions, and at times even statistical information as studies are revised. Any such modifications or even differences in image print qualities could lead to different interpretations of phases and deviations in age estimates.

Even if forensic anthropologists choose the same method from the same source, they may choose to use different statistical information in predicting skeletal age. The various statistical information (e.g., observed ranges, standard deviations, means, standard errors, etc.) reportedly used by respondents were extremely variable. Although use of the observed range was the most popular, 43% suggested that experience and expertise played a large role. Similar results were found when participants were asked what statistical information they would use if a certain skeletal trait was between two phases (e.g., sternal rib end with characteristics of both phases 4 and 5). Here, experience and expertise was the most popular response, followed by using the overlap of the two phases or the entire range of both.

When combining multiple age indicators (e.g., age estimates from the pubic symphysis, auricular surface, and sternal rib ends), the preferred techniques are even more variable, with none of them favored by even half of respondents. Experience and expertise once again was top of the list, with the most popular objective technique being use of the overlap of ranges presented by the methods. A high percentage of individuals report providing both a broad and narrow age range, and vary their methods on a case-by-case manner. Methodological considerations, such as disregarding inconsistent study estimates, putting more weight on methods felt to be more reliable, and rounding estimates to the nearest multiple of 5 or 10, will also affect final age estimates. While each of these situations may only alter estimates slightly, the combined effect of all of these methodological choices would be higher.

Much of this variation stems from the fact that different studies present different statistical information, and as pointed out by one respondent, they are based on different samples, making such statistical information not directly comparable. Certain multifactoral approaches, such as transition analysis, alleviate some of these statistical issues, but only 14 respondents reported using either Boldsen et al.'s ADBOU program (1), transition analysis in general, or an iterative Bayesian approach.

Spearman rank correlations and logistic regression results suggest that overall, the years of experience of the respondent does not play a significant role in their methodological preferences. This is not surprising given the high degree of variation in responses. Years of experience, however, was an important predictor of whether a respondent relies on their "experience and expertise" in determining an age estimate from a single study, when combining multiple phases/categories, or when combining information from multiple methods into a final age estimate. As might be expected, individuals with more years of experience were more likely to apply and rely on that experience during age estimation.

Conclusions

The results of this survey suggest that there is a high degree of individual variation in adult age estimation methodological preferences. While the majority of participants report using the same traditional methods, such as the Suchey-Brooks method (7–13), how they use the statistical information from these methods and how they combine age ranges from multiple methods into a final age estimate remains extremely varied and at times statistically invalid. Many still rely on experience and expertise when determining a final age estimate, in many cases to narrow the broad range provided by statistical information, such as confidence intervals. While experience is no doubt an important factor, this introduces a certain amount of subjectivity in the estimate.

The issues presented by these survey results are complex. Although a resolution is not obvious, it is hoped that this study will promote further research and discussion on aging methods within the forensic anthropology community. Forensic anthropologists are challenged to deal with the inconsistent chronological appearance of degenerative aging traits and yet the forensic necessity for accurate and useful adult skeletal age estimates. Many forensic anthropologists acknowledge these issues and this survey validates those concerns. There are currently no standards on what statistical information studies report in the literature, what statistical information practitioners should use from the studies or consensus on how to combine the information from multiple age indicators into a final estimate to report to officials. It should be noted that despite this lack of standardization, all of the various methods presented by participants may produce accurate age estimates regardless of individual techniques and reliance on experience. While experience is no doubt necessary, its acceptable role and interaction with scientific methods have yet to be defined. While historically age estimation was regarded as "ultimately an art, not a precise science" (38, p. 323), in the face of *Daubert* and our current era of validation and scientific rigor, these issues need to be addressed.

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