W12   KidStats: Improving the Subadult Biological Profile

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Learning Overview: After attending this workshop, attendees will be trained on the most up-to-date techniques to estimate subadult age and sex and on KidStats, a freely available web-based graphical user interface.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing attendees with applied experience in collecting subadult data from 3D printed remains of individuals between birth and 15 years and the application of these data in a statistical framework.

A lack of modern subadult samples has greatly limited the development and validation of subadult biological profile techniques, as well as practitioners' experiences working with subadult remains. The computer tomography sample of more than 1,100 individuals aged between birth and 20 years, collected from the University of New Mexico Office of the Medical Investigator and from the Office of the Chief Medical Examiner in Baltimore MD, enabled this study to collect more than 200 variables (i.e., age and sex indicators) from most individuals, resulting in an extraordinary amount of knowledge regarding skeletal and dental growth and development and variation within a large, modern sample of North American children. This workshop will take the attendees through the subadult skeletal research experience, from research design challenges to the results obtained, as well as a discussion on how the project results vary from previous publications.

Although subadult age estimation has been historically considered a reliable practice, current age estimations continue to face limitations. For example, methods tend to focus on only a single variable, such as dental development. One of the main methods that will be discussed is the mixed cumulative probit algorithm that was designed specifically for dealing with continuous (diaphyseal dimensions) in conjunction with ordinal age indicators (epiphyseal fusion and dental formation) to predict a continuous outcome variable (age). Previously in subadult age estimation techniques, the age estimation methodology has been limited to a single variable and a single indicator without any statistical way to combine different age estimations. This model enables individuals to enter any combination of data for epiphyseal fusion, diaphyseal dimensions, appearance of ossification centers, or dental formation and yields one age estimate with 95% confidence intervals, thus meeting the best practices of our field. Not only is this novel algorithm applicable in KidStats, it is also freely available in an R package that has been released. While the main focus of the workshop is on age estimation and KidStats, other topics (or research) will be presented, including the utility of the subadult pelvis for sex estimation, subadult body mass estimation, and subadult stature estimation.

Overall, this workshop seeks to provide attendees with experience working with subadult remains, familiarize them with modern techniques in estimating subadult biological profile parameters, and ensure they understand both the capabilities and challenges in performing such analyses. Three-dimensional (3D) prints of subadult remains will be used to guide attendees through the newly proposed age and sex methodologies. Because subadult skeletal samples are rarely available, the 3D printed material provides a unique opportunity for attendees to see how age and sex indicators vary throughout ontogeny.

Forensic Anthropology, Biological Profile, Juvenile