

Ethical Considerations When Conducting Undergraduate Research: An Experience with Human Remains

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Abstract

Many undergraduate research (UR) programs require students to be trained according to responsible conduct of research guidelines, which concentrate on the technical aspects of performing research. In this commentary, we explain that undergraduate projects may require special ethical considerations when social, cultural, and legal circumstances are an integral feature of the research. The authors' opportunity to work with human remains prompted the realization that undergraduates in any discipline may need additional ethical training to help prepare them to cope with the subject matter specific to their research project. We advocate for mentors to become aware of the potential emotions and concerns their UR students might encounter conducting this research and to prepare them to address and handle these unique ethical challenges.

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Research Ethics

Biology is the study of life as it exists today and as it might have existed in the past. Biologists need to be cognizant of what constitutes responsible behavior and practice as they perform all aspects of the research process under every conceivable circumstance, as should all researchers regardless of their discipline. As a result of the responsible conduct of research (RCR) guidelines set forth by the National Institutes of Health in December 1989 (US Department of Health and Human Services 1989), most institutions of higher education require formal

RCR education for all their research students (Kalichman 2013). It is no longer sufficient to assume that the next generation of researchers is being trained adequately in RCR behavior. Instead, a more standardized process is necessary to ensure that responsible conduct is properly conveyed to, and practiced by, all undergraduate research (UR) students. The National Science Foundation (NSF) uses more specific and encompassing terminology to describe expected research behavior, that is, responsible and ethical conduct of research (NSF 2025). However, neither set of guidelines addresses the ethical nature of the research subject matter itself, but rather the guidelines inform technical procedures that are applicable to a broad array of scientific disciplines. In this commentary, we point out that some undergraduate projects require special ethical considerations, when social, cultural, and legal circumstances are an added feature of the research. When this is the case, UR students should receive additional ethics training, which will vary depending on the subject matter.

It has been our experience that working with human remains required us to address our emotional responses and the ethical aspects encompassing how to act with respect and dignity for these materials throughout our research project. It is also important to acknowledge that working on human remains is not under the purview of human subjects' research (only the living are), and therefore is exempt from Institutional Review Board (IRB) oversight. Ahern-Rindell has chaired her institution's IRB in the past and is familiar with the constraints and restrictions that all disciplines must consider when working with human subjects. But because IRB's guidance is not applicable to human remains, it was essential that we educate ourselves on how best to act ethically in this particular case.

PURE Program

In recent years, because of technological advances, molecular anthropological studies are employed more frequently to study the ancient past. By analyzing the genetics of different human populations, one can answer specific questions about ancestral lineages and migration patterns. In particular, methodological advances in ancient DNA (aDNA) extraction and analysis have better clarified populating of the major continental regions of the world. The analysis of aDNA relies on human remains, which are the major source of preserved genetic material found in skeletal bones and teeth.

How human remains are unearthed, handled, stored, and analyzed became a concern of ours when we were invited to take part in the Pollentia Undergraduate Research Experience (PURE) program of the University of Portland (UP). Beginning in spring 2012, UP and the University of Barcelona collaborated to work together on an archaeological excavation. The research focused on answering questions about Christian antiquity found on the island of Mallorca in the ancient Roman city of Pollentia in Alcudia, Spain. The faculty and student researchers used physical and human sciences to study the preservation and conservation of Pollentia's cultural heritage and its ancestral origins (Ahern-Rindell et al. 2017; Seely 2017). For six weeks in the summer of 2016, Ahern-Rindell and four of her research students joined with other UP faculty and their students to help at the archaeological excavation of Pollentia's ancient burial grounds. After our time in Mallorca, we returned to the genetics laboratory at UP and used molecular techniques to extract and analyze the aDNA from the human remains excavated from the various burial sites found in the ruins of the Roman city.

Although one of Ahern-Rindell's scholarly interests pertains to the ethical implications of genetics research, Ahern-Rindell had never considered human remains as a material for study with her UR students. Digging up bones from a burial ground was a very unusual experience, and caused us to pause and consider more intently how to behave ethically in such a situation. During our time in Spain and when we returned, we pondered our approach to laboratory work with the bones when they were shipped to us from Spain. We wanted to conduct our research in an ethical manner that respected the dignity of life that once was, and we were mindful of the cultural and social mores as well as the legal ramifications pertaining to work involving exhumed, historic biomaterials. Fortunately, UP's Dundon-Berchtold Institute supports UR that allows faculty-student teams to delve into the ethics of their scholarly research (Dundon-Berchtold Institute 2025).

Application of Ethics Program

Dundon-Berchtold Institute's Research in the Application of Ethics program awards faculty and student research teams

fellowships to delve into the unique ethical aspects of their scholarly projects. Every spring semester, there is a call for ethics project proposals for review and potential funding for the next academic year. It is up to each faculty-student team to outline a plan that explains how they will investigate the ethical facets and potential consequences of the disciplinary scholarship they are currently conducting. The premise of the program is to help research teams recognize and appreciate the ethical aspects of their research, and in so doing become more knowledgeable about ethical principles in general and the role ethics play in their scholarly endeavors. This program allows researchers to go beyond the fundamental procedural training that their specific disciplines provide them through RCR and allows them to explore the less tangible and more humanistic aspects of their projects. The program also provides opportunities for all the funded faculty-student teams to meet periodically to share the ethical issues they are encountering as they conduct their research. At the end of the spring semester, the faculty-student teams are invited to a campus dinner to present their findings. They also are encouraged to give off-campus presentations and submit their work for publication.

We applied to Dundon-Berchtold Institute's Research in the Application of Ethics program to explore this important topic during the 2017–2018 academic year. We proposed exploring the literature pertaining to instances in which scientific research involving human remains has been the focus of controversy so we could better understand not only the cultural, social, and legal issues but also the ethical ones. In particular, we decided to examine the circumstances pertaining to the human skeleton found in Kennewick, WA, in 1996, which came to be known as the Kennewick Man (Gosman 2018; Owsley and Jantz 2014).

In 2017, the skeletal remains of the Kennewick Man, also known as the Ancient One, were repatriated to the ground as a result of being identified by aDNA analysis to be distantly related to Indigenous North Americans. Once this ancestral connection was confirmed, Native American tribes asserted their legal rights to rebury the remains under the Native American Graves Protection and Repatriation Act (NAGPRA; Bruning 2006). This federal law states that once an ancestral connection is made to Native Americans, the remains are subject to reburial according to Indian customs and practices. The twenty-some years in between the discovery of the remains and their reburial were a tumultuous time because of an ongoing custody dispute over the skeletal remains (Owsley and Jantz 2014).

Initially, the federal government had legal custody of the remains because the skeleton was found on land whose jurisdiction was held by the US Army Corps of Engineers ("United States Army Corps of Engineers" 2025). Because the land had previously been occupied by the Columbia Basin tribes of the Pacific Northwest, the Native American

tribes claimed that they should have custody of any ancestral remains buried on the land. In opposition, members of the scientific community argued that research on the skeleton should be allowed to determine its age and verify its ancestral lineage. Based only on skull morphology, it was initially thought that the Ancient One might be more closely related to Polynesian or Southeast Asian people, in which case NAGPRA would not apply. The custody battle worked its way through the legal system, and for a time the scientists obtained access to study the remains (Owsley and Jantz 2014).

It was determined with radiocarbon testing that Kennewick Man lived around 8500 years ago. At the time, the skeleton was one of the oldest and most complete ever found in the Americas, and therefore of high scientific interest. Over the years, aDNA analysis technology improved, and in June 2015 a group of scientists at the University of Copenhagen published a study that found the genome of the Kennewick Man to be within the diverse group of contemporary Native Americans (Rasmussen et al. 2015). The following year, the US House and Senate passed legislation returning the remains to a coalition of the Columbia Basin tribes in accordance with NAGPRA (Owsley and Jantz 2014). The controversy surrounding the Ancient One resulted from groups of people with different perspectives and aims. It demonstrates how important it is, when human remains are involved, to maintain a dialogue between those with differing points of view and to be respectful when determining the ethical way forward. The Kennewick Man case study serves as a good example during undergraduate ethics training for research with human remains. Subsequently there have been global efforts to institute guidelines when doing research pertaining to human remains and all artifacts in the context of competing social and cultural demands. Historically this has not always been the case.

Human Remains

It is our species' natural curiosity to explore and uncover what we can about the people from past civilizations. Tombs and burial grounds were pillaged and excavation sites were plundered by occupying powers. Human remains were often taken from graves without consent, or unclaimed bodies were absconded with, without authoritative approval (Clegg 2020). In spite of the consensus view that grave robbing was inappropriate behavior, it was somewhat tolerated because of the potential knowledge that could be acquired. The robbing of graves is another area that can be explored when performing ethics training for human remains research.

Initially, studies of the dead provided a primer on the anatomical structure of the human body. One could learn about general health, the sex of the individual, and their diet, and skull measurements could help with approximation of geographic origin. Technological advancements

soon allowed for microscopic examinations, molecular and chemical analysis, and eventually xrays, ultrasound, and CT scans. All these techniques were implemented to treat the living because of what was learned from the dead's remains (Clegg 2020). As more information has become available about reprehensible actions and behaviors pertaining to inappropriate handling of human remains, global efforts have called for curtailing these past practices. Different organizations and societies have created their own ethical statements and codes of practice (American Anthropology Association 2024; Society for American Archaeology 2021).

Because of the sensitive nature of death and feelings that arise when performing research involving human remains, special preparations should be taken in advance of exposure. In the case of undergraduates, some formal ethical training is recommended to prepare for expected emotional responses to one's first encounter with human remains. This provides an opportunity to discuss feelings that may occur and reassure individuals that these are natural responses (Haidt 2012). Following this, there should be an intentional review of specific ethical behaviors expected when handling human remains to ensure that all actions are respectful and dignified. Humans are ethical beings with an instinctive sense of fairness. We have an awareness when something does not feel right even if we are not able to articulate it. We have an inclination toward empathy and feel a natural obligation to one another. These natural tendencies need to be encouraged and nurtured in our undergraduate research students.

Conclusion

A major outcome of the opportunity to think ethically about our work with human remains was an appreciation for the responsibility that scientists have to consider the application of their research and the possible ramifications it may have on society. We explained this in an op-ed article: "Our research has made us reflect on the responsibility we have as researchers to not only act with integrity, but to also be mindful of the people whom our research might affect. When we go into the laboratory to drill into bones, we know we hold in our hands a great privilege and opportunity to study history in the present, to tell the story of those without voices and to shine a light on the benefits of science for our larger community" (Gosman and Ahern-Rindell 2018).

Working with human remains is just one scholarly area that may evoke emotional responses in UR students. Engaging in certain types of research may have negative consequences, as can their findings if their application is not thoroughly considered beforehand. For example, artificial intelligence is another area in which research outcomes may be beneficial, or instead poorly designed algorithms may introduce bias or other potential harms, as we are only starting to realize. Regardless of the discipline,

we must consider the ethical nature of the research subject matter we choose to investigate and adequately address the pertinent ethical issues with our UR students.

Conflict of Interest

The authors have no conflict of interest to declare.

Institutional Review Board

Not applicable.

Data Availability

Not applicable.

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Amelia Ahern-Rindell has a biology and genetics BS from the University of Illinois and MS and PhD degrees in genetics and cell biology from Washington State University. She taught and mentored undergraduates for 30 years and has emerita status at the University of Portland. Ahern-Rindell conducted research with about one hundred students and received UP's Mentor of the Year Award before retiring in 2022. She is a longtime CUR member, having served in many roles, including president, and is a 2025 Fellows Award recipient.

Raluca Gosman is an otolaryngology–head and neck surgery resident in Miami, FL. She earned her MD from Duke University and a BS in biology from the University of Portland. As an undergraduate, Gosman worked in Ahern-Rindell's laboratory characterizing ancient human DNA from excavated bones and conducted an ethics investigation on using human remains in research. She presented on both of these projects through the Honors Program at the university and at multiple conferences.