

PUBLIC PERCEPTIONS OF PALEOPATHOLOGY AND THE FUTURE OF OUTREACH

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Introduction

The previous chapters in this volume have been directed primarily towards researchers and students of paleopathology, as various authors have explored current methods for identifying diseases in the past, the present state of knowledge concerning a range of conditions identified in past peoples, and commonly addressed theoretical issues. In this contribution, we extend our gaze outwards and ask how paleopathology is perceived by non-specialists, including collaborating scholars and members of the public, in order to better understand what themes and ideas are being consumed through various media. To address this question, we consider three sources: first, we evaluate the top eight articles published in the *International Journal of Paleopathology (IJPP)* across the dimensions of citations, downloads, and social media presence; second, we explore how our field is marketed to the public through press releases from the news aggregator *Science Daily*; and third, we employ a frame analysis of popular paleopathology news articles in *Forbes* to glean information on key topics of interest to the general public. Finally, we reiterate our longstanding support of anthropologists engaged in public outreach and highlight some of the current work being done by our colleagues to communicate the core tenets of both our broader research field and the specialty of paleopathology. As we have seen with the ongoing COVID-19 pandemic, effective communication with non-specialist audiences is of the utmost importance in producing beneficial public health outcomes. We therefore aim in this chapter to better understand what intrigues non-specialists about paleopathology, with the hope that the themes we draw out of our analysis can be used to better communicate information about health in the past and in the present.

Perceptions of Paleopathology

Analysis of non-specialists' understanding of paleopathology is a relatively new line of research. While US anthropology as a broader field engaged in a post-modern turn in the 1990s, bringing in ideas like public accessibility of practitioner-generated knowledge (e.g., Borofsky & De Lauri, 2019; Borofsky, 2000), the concept of communicating information about ancient diseases to multiple audiences is much more recent. With a rise in user-generated

web content and social media starting around 2005, academic archaeologists began dipping toes into the Web 2.0 waters, producing research websites, specialty blogs, and social media profiles in addition to retrospective and summary research articles on the value of this new form of public outreach (McDavid, 2004; Joyce & Tringham, 2007; De Koning, 2013; Meyers Emery & Killgrove, 2015; Morgan & Winters, 2015; Perry & Beale, 2015).

The first journal article to reflect broadly on the state of media engagement with the practice of paleopathology specifically, however, was Stojanowski and Duncan's (2015) paper in the *American Journal of Human Biology*. Their wide-ranging article included quantitative information on academic journal publication rankings and a qualitative investigation into articles published through the news aggregator *Science Daily*. At the time, they concluded that "'old bones' continue to capture the public imagination, but perhaps in ways not completely in line with professional interests" and suggested that "it is better for professional bioarchaeologists to help capture and shape public imagination about what we do" (2015:57–58). Since their article was published, Kristina Killgrove spent four and a half years (2015–2020) writing news articles for *Forbes* as a professional bioarchaeologist. We therefore sought both to replicate the methods that Stojanowski and Duncan used to reflect on media engagement with paleopathology since 2015 and to apply methods drawn from communications research to Killgrove's robust textual data set as a case study in discerning how various publics understand our work.

Academic Perceptions: International Journal of Paleopathology (IJPP)

In the past decade, publication of paleopathology-related articles has accelerated, with papers coming out frequently in the *International Journal of Osteoarchaeology*, *Bioarchaeology International*, and the *American Journal of Biological Anthropology*. The flagship journal of the Paleopathology Association, the *International Journal of Paleopathology (IJPP)*, first published in 2011, is unique in its publication of large numbers of review articles, case studies, and differential diagnoses of past health concerns (Mays, 2021). Because the *IJPP* includes articles reflecting all "four pillars" of paleopathology – human and nonhuman skeletal pathology, desiccated soft tissue pathology, and paleoparasitology (Buikstra, 2011; Mays, 2021) – an analysis of its content is an ideal starting point for evaluating how paleopathology is perceived by specialists, non-specialists, and the public.

We gathered the most frequently cited (three years), downloaded (90 days), and visible articles in social media (three years) published in the *IJPP* and report them in Table 32.1, assuming that high article citations reflect research interest by practitioners, that downloaded articles represent more general interest to non-specialist researchers and academic audiences, and that social media visibility is a proxy for public interest. We classified each article into one or more broad topical categories, including: case studies, differential diagnoses, evolutionary focus, interdisciplinary work, methodological, and response or review papers.

When the most popular or engaging articles published in the *IJPP* are split into broad topical categories, interesting patterns emerge. Methodological subject matter is of disproportionate interest to practitioners, for example, as five of the most frequently cited articles can be categorized as methods articles, whereas only one of the most downloaded and none of the popular social media articles focus on methods. Articles that focus on case studies are of interest to all audiences, but they are disproportionately represented among those that got the most social media attention, with seven of the top eight articles falling into this category. This finding suggests that a specific individual's or their community's health status may be the most intriguing aspect of paleopathology to the general public, while methods are more often cited by practitioners moving the discipline of paleopathology forward with their research.

Public Perceptions of Paleopathology and the Future of Outreach

Table 32.1 Most engaging peer-reviewed articles in the *International Journal of Paleopathology* (as of 27 December 2021) and their category codes

<i>Most cited</i> (prev. three years)		<i>Most downloaded</i> (prev. 90 days)		<i>Most social media attention</i> (prev. three years)	
1	New world origin of canine distemper: Interdisciplinary insights (Uhl et al., 2019)	E I	New world origin of canine distemper: Interdisciplinary insights (Uhl et al., 2019)	E I	On engagement with anthropology: Response to Bhattacharya et al. (Halcrow et al., 2018)
2	Multi-proxy stable isotope analyses of dentine microsections reveal diachronic changes in life history adaptations, mobility, and tuberculosis-induced wasting in prehistoric Liguria (Goude et al., 2020)	I M CS-R	The pathology of vitamin D deficiency in domesticated animals: An evolutionary and comparative overview (Uhl, 2018)	E Rev	Advances in regional paleopathology of the Southern Coast of the Central Andes (Tomasto-Cagigao, 2020)
3	Identification of working reindeer using paleopathology and enthesal changes (Salmi et al., 2020)	M	Towards a definition of Ancient Rare Diseases (ARD): Presenting a complex case of probable Legg-Calvé-Perthes Disease from the North Caucasian Bronze Age (2200–1650 cal BCE) (Fuchs et al., 2021)	DD CS-I	Sensationalism and speaking to the public: Scientific rigour and interdisciplinary collaborations in paleopathology (Snoddy et al., 2020)
4	The association between skeletal lesions and tuberculosis diagnosis using a probabilistic approach (Pedersen et al., 2019a)	M DD	Survival after trepanation – Early cranial surgery from Late Iron Age Switzerland (Moghaddam et al., 2015)	CS-I CS-R	A bioarchaeological and biocultural investigation of Chinese footbinding at the Xuecun archaeological site, Henan Province, China (Lee, 2019)
5	Multiple myeloma in paleopathology: A critical review (Riccomi et al., 2019)	DD Rev	Fancy shoes and painful feet: Hallux valgus and fracture risk in medieval Cambridge, England (Dittmar et al., 2021)	CS-C	Skeletal evidence for violent trauma from the bronze age Qijia culture (2,300–1,500 BCE), Gansu Province, China (Dittmar et al., 2019)

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	<i>Most cited (prev. three years)</i>	<i>Most downloaded (prev. 90 days)</i>	<i>Most social media attention (prev. three years)</i>
6	Tuberculosis in medieval and early modern Denmark: A paleoepidemiological perspective (Pedersen et al., 2019b)	E M How rare is rare? A literature survey of the last 45 years of paleopathological research on ancient rare diseases (Gresky et al., 2021)	Rev Osseous mass in a maxillary sinus of an adult male from the 16th–17th-century Spain: Differential diagnosis (González-Garrido et al., 2020)
7	Environmental correlates of growth patterns in Neolithic Liguria (Dori et al., 2020)	CS-R Neoplasm or not? General principles of morphologic analysis of dry bone specimens (Ragsdale et al., 2018)	DD M Evidence of congenital block vertebra in Pleistocene Cave Bear (<i>Ursus spelaeus</i>) from Cueva de Guantes (Fuentes-Sánchez et al., 2019)
8	Spatial paleopathology: A geographic approach to the etiology of cribrotic lesions in the prehistoric Andes (Scaffidi, 2020)	M CS-R Periodontal disease in sheep and cattle: Understanding dental health in past animal populations (Holmes et al., 2021)	CS-R E Gastrointestinal infection in Italy during the Roman Imperial and Longobard periods: A paleoparasitological analysis of sediment from skeletal remains and sewer drains (Ledger et al., 2021)

*Category codes: CS (case study) -I/-C/-R (individual, community, regional); DD (differential diagnosis); E (evolutionary); I (interdisciplinary); M (methods); Resp (response); Rev (review)

Also significant is the social media popularity of two brief communication articles cautioning researchers from other fields not to sensationalize archaeological discoveries and urging interdisciplinary rigor. The *IJPP* article with the most social media engagement is a critical response to a non-specialist analysis of an Andean fetal mummy (Halcrow et al., 2018), while the *IJPP* article with the third-highest social media engagement highlights how non-specialist journals often publish studies with poor paleopathological methods and no interdisciplinary communication (Snoddy et al., 2020).

This small sample of peer-reviewed publications in the *IJPP* points us towards general trends in popularity of topics among practitioners, the broader scientific research community, and the general public. To focus more specifically on the non-specialist understanding of paleopathology, we turn to a summary of media communication through press releases.

Public Relations Perceptions: Science Daily

Much of the news coverage of paleopathology research that reaches the general public initially comes through press releases. Written by a media professional at a scholar's institution or by the media wing of a journal or its publisher, a press release in paleopathology is typically a summary of a published, peer-reviewed research article or an explanation of an individual or group research program. While press releases are ostensibly accurate encapsulations of a specialty topic for the general public, they can often exaggerate the implications of the findings or show bias towards the contributions of certain scholars (Killgrove, 2019a; Snoddy et al., 2020).

In their 2015 article, Stojanowski and Duncan reviewed 27 bioarchaeological articles featured by the press release aggregator *Science Daily* for the years 2011–2013. They found that mummies and King Richard III dominated the *Science Daily* press releases in that time period, with additional stories falling into their qualitative categories of disease, curiosities, superlatives (e.g., “the first...”), Vikings, and diet. Only about one-third of their sample involved paleopathology specifically, however.

We present in Table 32.2 summary information for the 13 paleopathology-related press releases from *Science Daily* for the year 2021. Of the institutional media offices that created these posts, Cambridge University led with four postings, or one-third of the total. Other institutions, such as the Max Planck Institute, the University of Warwick, and the University of Otago, have one each. These press releases summarize papers published in top tier journals – one each in *Nature*, *Science*, and *Proceedings of the National Academy of Sciences* – and represent research that institutions wished to promote. As above, we classified each article into one or more broad categories, including: DNA, pathogen/human evolution, virus/bacterium/plague, case study, care/empathy/violence, methods, and interdisciplinary. Table 32.2 presents the titles of the *Science Daily* pieces alongside those of the original articles.

Table 32.2 Paleopathology press releases in *Science Daily* from January–December 2021 (Accessed 28 December 2021 from the Anthropology & Archaeology section)

<i>Science Daily</i> title (source)	Research article (journal)	Categories
Ten millennia of hepatitis B virus evolution described (Max Planck Institute)	Ten millennia of hepatitis B virus evolution (Kocher et al. 2021, <i>Science</i>)	DNA Pathogen/Human Evolution and Dispersal Virus
Transatlantic slave trade introduced novel pathogenic viruses in the Americas (<i>eLife</i>)	Ancient viral genomes reveal introduction of human pathogenic viruses into Mexico during the transatlantic slave trade (Guzmán-Solís et al. 2021, <i>eLife</i>)	DNA Empathy Pathogen/Human Evolution and Dispersal Virus
First evidence that medieval plague victims were buried individually with “considerable care” (University of Cambridge)	Beyond plague pits: Using genetics to identify responses to plague in Medieval Cambridgeshire (Cessford et al. 2021, <i>European Journal of Archaeology</i>)	Bacterium Care Case Study – Community DNA Empathy Plague
Vitamin D deficiency for the first time visible after cremation (Vrije Universiteit Brussel)	Interglobular dentine attributed to vitamin D deficiency visible in cremated human teeth (Veselka & Snoeck, 2021, <i>Scientific Reports</i>)	Experimental Methods Superlative
Scientists dig deep to understand the effects of population pressure on violence levels (Okayama University)	Population pressure and prehistoric violence in the Yayoi period of Japan (Nakagawa et al. 2021, <i>Journal of Archaeological Science</i>)	Case Study – Region Evolutionary Violence

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<i>Science Daily title (source)</i>	<i>Research article (journal)</i>	<i>Categories</i>
<p>Tooth cavities provide unique ecological insight into living primates and fossil humans (University of Otago)</p>	<p>Dental caries in wild primates: Interproximal cavities on anterior teeth (Towle et al. 2022, <i>American Journal of Primatology</i>)</p> <p>Dental caries in South African fossil hominins (Towle et al. 2021, <i>South African Journal of Science</i>)</p>	<p>Empathy Evolutionary Human and Nonhuman</p>
<p>Justinianic plague was nothing like flu and may have struck England before it reached Constantinople, new study suggests (University of Cambridge)</p>	<p>Viewpoint: New approaches to the “Plague of Justinian” (Sarris, 2021, <i>Past & Present</i>)</p>	<p>Bacterium DNA Plague Dispersal</p>
<p>Fashion for pointy shoes unleashed plague of bunions in medieval Britain (University of Cambridge)</p>	<p>Fancy shoes and painful feet: Hallux valgus and fracture risk in Medieval Cambridge, England (Dittmar et al. 2021, <i>International Journal of Paleopathology</i>)</p>	<p>Case Study – Community Empathy Interdisciplinary</p>
<p>Early migrations of Siberians to America tracked using bacterial population structures (University of Warwick)</p>	<p><i>Helicobacter pylori</i>’s historical journey through Siberia and the Americas (Moodley et al. 2021, <i>PNAS</i>)</p>	<p>Bacteria DNA Pathogen/Human Evolution and Dispersal</p>
<p>Ancient gut microbiomes may offer clues to modern disease (Joslin Diabetes Center)</p>	<p>Reconstruction of ancient microbial genomes from the human gut (Wibowo et al. 2021, <i>Nature</i>)</p>	<p>Coprolites DNA Interdisciplinary Microbiomes</p>
<p>Cancer rates in medieval Britain around ten times higher than previously thought (University of Cambridge)</p>	<p>The prevalence of cancer in Britain before industrialization (Mitchell et al. 2021, <i>Cancer</i>)</p>	<p>Cancer Case Study – Community Interdisciplinary</p>
<p>Nits on ancient mummies shed light on South American ancestry (University of Reading)</p>	<p>Ancient human genomes and environmental DNA from the cement attaching 2,000-year-old head lice nits (Pedersen et al. 2022, <i>Molecular Biology & Evolution</i>)</p>	<p>DNA Interdisciplinary Lice Methods Mummies Pathogen/Human Dispersal</p>
<p>Ancient feces shows people in present-day Austria drank beer and ate blue cheese up to 2,700 years ago (Cell Press)</p>	<p>Hallstatt miners consumed blue cheese and beer during the Iron Age and retained a non-Westernized gut microbiome until the Baroque period (Maixner et al. 2021, <i>Current Biology</i>)</p>	<p>Case Study – Community Coprolites Diet DNA Fungi Microbiome Proteomic Analysis</p>

This small sample shows that 2021 was a year when DNA (n=9) and plague (n=3) dominated *Science Daily* press releases. Neither is surprising, given the remarkable advances made in the direct recovery and amplification of aDNA and phylogenetic models based on molecular databases of increasing size and resolution (see Chapter 8). Additionally, plague was a subject of popular interest well before COVID-19 (see Chapter 31), but its heightened visibility during a global pandemic is to be expected. Prior to 2020, for example, part of the allure of the Black Death was as an exotic and morbid event – something that could only happen in the distant past. The continuing coronavirus pandemic, however, may have stimulated public interest in learning more about past plagues, and interdisciplinary scholarship on the Black Death provides rich and personal historical accounts that could be providing a mirror for our own experiences as we struggle to cope with illness, death, quarantine, and isolation.

Press release aggregators such as *Science Daily*, however, largely reflect work produced by scholars at research-intensive universities with dedicated PR departments interested in communicating the work their faculty accomplish. These releases become intertwined in the science news cycle, where they sometimes yield an accurate and interesting summary of a new research study, but where they are more often republished uncritically, passing along sensationalized and exaggerated information to a non-specialist public. In order to fully understand what the general public is learning about paleopathology, we move to a detailed, text-based analysis of popular science articles.

General Public Perceptions: Killgrove Forbes Column

In his 1996 Distinguished Lecture in Archaeology at the American Anthropological Association's annual meeting, Jeremy Sabloff remarked that “While archaeologists may think they are talking clearly to the public, what the latter often hears, I believe, is ‘blah, blah, blah, tomb, blah, blah blah, sacrifice, blah, blah, blah, arrowhead’” (1998:869). Here we attempt to identify what directly piques the public's interest and how the information is presented to them through frame analysis, a technique from communication studies that “can offer insight into the choices and interpretations journalists make when framing a story, which can ultimately define the nature of the debate and suggest to audience members how an issue can be interpreted” (Touri & Koteyko, 2015:602). Using article hit counts and journalistic research methods on a single-authored online science news column, we identify both the vocabulary and journalistic frames that have particularly intrigued the public in recent years.

Frame analysis in culture studies dates back at least to 1974, when sociologist Erving Goffman wrote the book *Frame Analysis: An Essay on the Organization of Experience*. Based on his understanding of anthropologist Gregory Bateson's concept of psychological framing, Goffman worked to understand how conceptual frames – which are often linguistically mediated – help people perceive themselves and their society and construct meaning from their world. A frame analysis of a newsworthy topic can be accomplished inductively, deductively, or using a combination of the two (e.g., Touri & Koteyko, 2015; VanGorp & Vercruyse, 2012). For inductive analysis, keywords and concordances among these words in the examined set of media are statistically identified to pull out instances of unusually high usage of particular language. These terms are therefore assumed to indicate journalistic emphasis and, when paired with data on article popularity, can suggest ideas or meanings that piqued the public's interest. Deductive frame analysis skips this step and uses already defined frames to understand how the information is presented. In combining these methods, communications researchers such as Touri and Koteyko (2015) have employed inductive analysis to generate

basic frames and then deductive analysis to understand news issues. Frame analyses generated in this manner include inductively generated statistics followed by a matrix of deductively generated news frames.

One archaeologically relevant example of frame analysis comes from a 2005 article by communication researchers Cynthia-Lou Coleman and Erin Dysart on the news media's framing of Kennewick Man/The Ancient One. They performed a close reading of 155 articles published over an eight-year period to identify frames and assess the extent of the scientific-cultural dichotomy of the news coverage. In their analysis, Coleman and Dysart discovered frames often highlighted "conflicts using war and battle metaphors, religion versus science or rationality, the legal and moral rights of stakeholders within the rationality of the court system, the political rights and motives of stakeholders, and the persuasive nature of progress" (2005:13). Further, in investigating the statistical use of specific words, Coleman and Dysart found that, for example, "the term *significance* is used to refer to the scientific perspective but is rarely used in framing Indian accounts" (2005:15). The framing of the news coverage they analyzed "has resulted in a disservice to publics," they concluded, particularly because the Kennewick Man news frames "channel stereotypes of cowboy-and-Indian skirmishes of the past, thus confusing contemporary arguments, such as repatriation, with vestigial visions of a conquered people" (2005:22).

For our frame analysis, we focus on a *Forbes* Science column that was written by bioarchaeologist Kristina Killgrove from May 2015 through January 2020. During this period, Killgrove wrote 325 articles; of those, 108 were focused on paleopathology, or about one-third of all articles (see Killgrove, 2021 and Table 32.3). At the time of publication, all *Forbes* articles were widely accessible and free to read (albeit with ads). Using a multiscale approach – deductive analysis of frames based on inductive analysis of keywords – we identified patterns in word frequencies, concordances with popularity, and journalistic news frames that signal how the general public both consumes and understands paleopathology news.

Inductive Frame Analysis

In just over four years' time, the 79 paleopathology-focused *Forbes* articles for which we have popularity data received about 2.6 million hits from individuals interested in these news stories. Although no hit numbers were available for the additional 29 articles, we can extrapolate from the available data to estimate that the total number of hits on all 108 articles was likely closer to 3.5 million. It is worth further exploring where the information on paleopathology came from and what the general themes were that these millions of readers viewed.

Table 32.3 includes a title, source, hit count, and topic(s) for each of the 108 articles. Most of the news items came from information published in the *International Journal of Paleopathology* (n=17) and the *International Journal of Osteoarchaeology* (n=17), for a total of 31.5% of all the news articles. Additional journals with more than one newsworthy paleopathology article included *PLOS* (6), *Antiquity* (4), *American Journal of Physical/Biological Anthropology* (4) and its conference (4), *Journal of Archaeological Science: Reports* (3), *Latin American Antiquity* (3), *Archaeometry* (2), and *Nature Communications* (2). All told, 57% of paleopathology news articles came from information published in these academic journals.

In coding topics for this step, we used essentially the same categories as above (see Table 32.2). Each news article was coded as *individual* when focused on one person and *community* when focused on multiple individuals; the number of individual case studies in these *Forbes* pieces (59 or 55%) slightly outweighed the community studies (49 or 45%). Each article was also coded for one or more themes, as follows: (1) specific disease or named condition (57%);

Table 32.3 Characteristics of paleopathology articles in *Forbes* (2015–2020)

Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	(Vulnerable) Empathy/Sympathy	Macabre/Curiosity	Methods	Supernative (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprolites/Microbiome/Paleoparasitology
Healthy Vampires Emerge From Graves in Medieval Polish Cemetery	AAPA conf	292,749	C	X	X								
Alexander The Great's Father Found in Tomb with Foreign Princess	IJOA	212,697	I				U		X				
Archaeologists Find Bound Bodies of Enslaved Africans in Portuguese Trash Dump	IJOA	170,177	C	X					X				
Here's How Corsets Deformed the Skeletons of Victorian Women	NEXUS	154,292	I	X	X								
Archaeologists Discover a New Profession in an Ancient Egyptian Woman's Teeth	Edited volume	142,552	I				U						
Skeleton of Medieval Giantess Unearthed from Polish Cemetery	Edited volume	136,983	I	X	X		U				X		
How Castration and Opera Changed the Skeleton of 19th-Century Singer Pacchierotti	Nature Scientific Reports	117,447	I	X	X		U				X		
Castration Affected Skeleton of Famous Opera Singer Farinelli	IJPP/J of Anatomy	109,532	I	X	X		U				X		
Archaeologists Say Archaeologists Discover Amazon Warrior in Ancient Armenian Grave	IJOA	106,301	I		X		U		X				

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Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	Empathy/Sympathy (Vulnerable)	Macabre/Curiosity	Methods	Supernative (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprofites/Microbiome/Paleoparasitology
This Ancient Greek's Breastbone Shows He Was Executed with Terrifying Precision	Access	80,765	I		X				X				
Archaeological Skeletons from London Prove Some Romans Were Lead Poisoned	Archaeology Archaeometry	70,199	C								X		
DNA Analysis from Colonial Delaware Skeletons Reveals Beginning of American Slave Trade	AJPA	58,303	C					X	X				
Industrial Revolution Caused Rise in Cancer, Obesity, and Arthritis, Archaeologists Suggest	Press release	50,599	C			X				X			
Mystery Of Morbid Aztec Skull Masks Solved by Archaeologists	Current Anthropology	49,509	C		X				X				
Bronze Arrowhead Embedded in Spine Shows Elite Iron Age Warrior Survived Battle	IJOA	41,751	I		X				X				
Skeletons of Napoleon's Soldiers Discovered in Mass Grave Show Signs of Starvation	Master's theses	41,418	C						X				
What Does an Ancient Skull from Tennessee Tell Archaeologists about the Evolution of Syphilis?	IJPP	39,260	I							X	X		
Ancient Mesoamerican Recipe for Cooking Human Flesh Decoded by Archaeologists	Archaeometry	38,443	C		X	X							
Evil Twin Ovarian Tumor Found in Skeleton from 16th-Century Peru	IJPP	36,499	I		X								X

Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	Empathy/Sympathy (Vulnerable)	Macabre/Curiosity	Methods	Supernative (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprofites/Microbiome/Paleoparasitology
Mass Grave from War of 1812 Gives Archaeologists First Evidence of Buckshot Injuries	JAS:R	35,623	C			X			X				
Archaeologists Discover Elite 6th Century AD Cavalryman with Unique Foot Prosthesis	IJPP	35,019	I	X			U				X		
This Bone is the Only Skeletal Evidence for Crucifixion in the Ancient World	Various	31,885	I				S		X		X		
Man Bound to Tree Has Right Hand Cut Off in 14th-Century Blood Feud	IJPP	28,604	I						X		X		
Mass Grave from 30 Years' War Reveals Brutal Cavalry Attack	PLOS	27,747	C						X				
Heel Bone from Italy is Only Second Example of Crucifixion Ever Found	Archaeol & Anthropol Sciences	26,311	I				S		X		X		
Babies in Ancient Ecuador Were Buried with Human Skull Helmets	Latin Am/Antiq	25,750	C	X	X								
Mass Grave Reveals Ottoman Soldiers Fought to the Death in 16th-Century Romania	IJOA	24,003	C		X				X				
This Skeleton is the Oldest Known Ancient Olympic Athlete	Various	22,692	I				S					X	
Revolutionary War Hero's Skeleton Suggests He Was Intersex	Documentary	22,305	I	X	X		U		X		X		
Prehistoric Native American Woman Shot with Four Arrows Died While Pregnant	AAPA conf	20,821	I	X					X		X		

(Continued)

Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	Empathy/Sympathy (Vulnerable)	Macabre/Curiosity	Methods	Supernative (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprofites/Microbiome/Paleoparasitology
Gruesome Evidence of Political Torture Found on Precolumbian Skulls	Latin Am/Antiq	20,648	C		X				X				
Archaeologists Discover How Women's Bodies Were Dissected in Victorian England	Bioarch Int'l	19,758	C	X	X								
Mass Sacrifice of Children and Llamas in Ancient Peru Reflects Trauma Over Climate Change	PLOS	16,631	C		X				X				
This Woman from Medieval Iceland Lived with a Disfiguring Facial Anomaly	IJPP	16,321	I	X	X						X		
Brutal Brawls and Cranial Surgery Discovered on Ancient Skeletons from Lake Titicaca	IJOA	16,143	C						X		X		
Pot Polish on Bones from Franklin's 1845 Arctic Expedition is Evidence of Cannibalism	IJOA	14,387	C		X				X				
How a Pregnant Woman's Love of Dogs Led to Death by Parasite in Ancient Greece	IJOA	14,343	I	X							X	X	
Intestinal Worm Discovered in Ancient Roman Coffin	Korean J of Parasitology	13,654	I								X	X	
Bones of Saint Nicholas Reveal What Santa Claus Really Looked Like	Various	12,413	I				U		X				
Skeletons of Two Possible Eunuchs Discovered in Ancient Egypt	AAPA conf	11,589	I	X	X								X

Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	(Vulnerable) Empathy/Sympathy	Macabre/Curiosity	Methods	Supernatural (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprofites/Microbiome/Paleoparasitology
Did Toxic Rum Kill These 19th-Century British Soldiers?	Conf proceedings	11,250	C						X			X	
Bones of Indigenous Victim Reveal Brutality of European Colonization of Gran Canaria	IJOA	10,514	I	X					X				
Roman Forum Yields Stash of Teeth Extracted by Ancient Dentist	Int'l J of Anthropology	10,426	C				U					X	
Inside the Last Meals of Ancient Victims of Sacrifice and Murder	Various	10,391	C	X	X				X				
Infant Burials and Decapitated Men in Ancient Teotihuacan Neighborhood Reveal Diverse Origins	PLOS	10,227	C	X	X			X	X				
Archaeologists Find Case of Dwarfism in 3rd Millennium BC China	IJPP	8,819	I		X							X	
Brawny Bones Reveal Medieval Hungarian Warriors Were Accomplished Archers	Acta Bio. Szegediensis	7,946	C						X			X	
World's Oldest Cold Case: A 430,000-Year-Old Murder Victim Found in Pit of Bones	PLOS	7,620	I		X		S		X				
Plague Genome Sequenced from 6th-Century Woman's Teeth	Molecular Bio & Evolution	7,587	I					X		X		X	
Mysteries of the Black Death, Shroud of Turin, and Origins of Early Americans Solved with DNA	Various	6,969	C					X		X		X	

(Continued)

Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	Empathy/Sympathy (Vulnerable)	Macabre/Curiosity	Methods	Supernative (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprofites/Microbiome/Paleoparasitology
In Ancient Peru, Archaeologists Find Rare Spinal Condition and Possible Inbreeding	AAPA conf	6,852	C	X								X	
Christian Cemetery from Viking Age Iceland Reveals Strenuous Lives and Early Deaths	IJOA	6,600	C						X			X	
Earliest Case of Leprosy in Britain Reveals Scandinavian Origins of the Disease	AAPA conf	6,517	I				S	X		X		X	
DNA Confirms Headless Roman-Era Gladiator Not from Britain – and Maybe Not a Gladiator	Nature Comms.	6,188	I					X	X				
London Crossrail Dig Hits Beheaded Romans	Press release	6,048	C						X				
How Grave Robbers and Medical Students Helped Dehumanize 19th-Century Blacks and The Poor	Various	5,631	C	X					X				
This Defender of a Byzantine Fort Was Decapitated by the Ottomans	Byzantina Symmeikta	5,345	I						X				
Skeletons of Jewish Victims of Inquisition Discovered in Ancient Portuguese Trash Heap	JAA	5,062	C	X					X				
To Drug Test Shakespeare's Bones Or Not to Drug Test Them? That is the Question	Media	4,856	I				U					X	
Ancient Pompeians Had Good Dental Health but Were Not Necessarily Vegetarians	Media	4,479	C										X

Forbes title	Hits	Source	Individual (I)/Community (C) Case Study	Empathy/Sympathy (Vulnerable)	Macabre/Curiosity	Methods	Supernatural (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprofites/Microbiome/Paleoparasitology
Ancient Roman Man Tiptoed Through Life from a Hip Fracture	4,293	IJPP	I	X								X	
Cannibalism Is Much Older Than Drew Barrymore's Santa Clarita Diet	4,236	Various	I		X				X				
Skinned, Carved and Boiled Skull Cup Reveals Cannibalism in Neolithic Spain	4,004	AJPA	I		X				X				
Earliest Case of Scurvy in Ancient Egypt Detected by Archaeologists	3,894	IJPP	I			S				X		X	
Young Woman with Disabilities Found in Artifact-Packed Bronze Age Burial	3,740	IJPP	I	X								X	
A Case of Death in Childbirth in Neolithic China	3,653	IJOA	I	X								X	
Rotten Roman Baby Teeth Blamed on Honey, Porridge	3,383	IJOA	I	X								X	
Kids' Skulls Reveal Traumatic Death in Ancient France	3,254	IJOA	C	X					X				
Twisted Knee Might Identify Alexander the Great's Father but Some Are Skeptical	3,243	PNAS	I			U			X				
Why Was This Medieval Sicilian Stabbed in the Back and Buried Face-Down?	2,987	IJOA	I		X				X				
Children in Manhattan Got Scurvy and Rickets, 19th-Century Skeletons Reveal	2,487	PhD diss	C	X						X		X	

(Continued)

Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	Empathy/Sympathy (Vulnerable)	Macabre/Curiosity	Methods	Supernative (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprofites/Microbiome/Paleoparasitology
Teenager in Ancient Panamanian Ritual Burial Had Bone Cancer	IJPP	2,405	I		X							X	
Archaeologists Find Medieval Foot Fungus in Portuguese Cemetery	IJPP	2,162	I							X		X	
What Does Ancient Human Sacrifice Look Like?	Various	2,156	C		X				X				
Heart Disease Found in 16th-Century Greenland Mummies	Various	2,145	C								X		
Archaeologists Uncover the Skeleton of a Medieval Christian Pilgrim with Leprosy	PLOS	1,962	I									X	
Paleopoop from Neolithic Çatalhöyük Reveals Parasitic Infections	Neglected Tropical Diseases	1,579	C										X
DNA Evidence of Malaria Found in Imperial-Era Skeletons in Southern Italy	Antiquity	1,553	C					X		X		X	
Ancient Skeleton Yields Earliest Diagnosis of Legg-Calvé-Perthes Disease in China	Current Biology	1,146	I									X	
Aborted Fetus and Pill Bottle in 19th-Century New York Outhouse Reveal History of Family Planning	IJPP	N/A	I	X	X							X	
Ancient Baby Teeth Tell Archaeologists That Life in This South American Desert Was Stressful	Historical Archaeology	N/A	C										X

Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	(Vulnerable) Empathy/Sympathy	Macabre/Curiosity	Methods	Supernatural (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprolites/Microbiome/Paleoparasitology
Ancient Italian Skeletons Had Hemp in Their Teeth, Archaeologists Discover	AJPA	N/A	C								X		
Ancient Roman Poop Shows Rich and Poor Were Infected by Different Parasites	JAS:R	N/A	C								X	X	
Archaeologists Find Ancient Knife Hand Prosthesis on Medieval Warrior	JAS	N/A	I		X				X		X		
Archaeologists Find Deformed Dog Buried Near Ancient Child in the Philippines	IJOA	N/A	I	X							X		
Archaeologists Find Intestinal Worms in Burials from the Time of Hippocrates	JAS:R	N/A	C								X	X	
Archaeologists Study Medieval Mass Graves in Latvia for Evidence of Plague and Famine	PLOS	N/A	C								X		
Archaeologists Test Feces from Roman Latrine, Find Roundworm and Dysentery	IJPP	N/A	C			X					X	X	
Basketball-Sized Jaw Tumor Found on Skeleton Of 17th-Century Woman in West Virginia	IJOA	N/A	I		X						X		
Castrated Egyptian Mummy Is an Archaeological Mystery	Press release	N/A	I		X						X		
How the Black Death Caused Medieval Women to Shrink	AJHB	N/A	C			X					X		
Human Sacrifices at Massive Pyramid Along Great Wall Change Archaeologists' View of Early China	Antiquity	N/A	C		X				X				

(Continued)

Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	Empathy/Sympathy (Vulnerable)	Macabre/Curiosity	Methods	Supernative (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprofites/Microbiome/Paleoparasitology
International Experts Refute Alien Mummy Analysis, Question Ethics and Legality	IJPP	N/A	I	X	X	X		X					
Painted Bones Spark 4,500-Year-Old Burial Mystery in Ukraine	Baltic-Pontic Studies	N/A	I	X	X						X		
Skeleton Found at Late Roman Fortress in Egypt Reveals Violent Death	IJOA	N/A	I						X				
Skeleton of Famed Astronomer Tycho Brahe Finally Reveals Cause of Death	PLOS	N/A	I				U				X		
Skeleton Reveals 19th-Century Peoria Woman Had Chronic UTIs	IJPP	N/A	I			X					X		
Skeletons from Killing Fields Remind Visitors That Violence Is Not Easily Erased	PhD Diss	N/A	C						X				
Skeletons from Napoleonic Battlefield Shed Light on Soldiers' Health	IJPP	N/A	C			X					X		
Skeletons of Executed Immigrants Found in Neolithic Mass Grave in Germany, Archaeologists Report	Nature Comms.	N/A	C						X				
Skeletons of Pregnant Egyptian Woman and Fetus Found by Archaeologists Suggest Death in Childbirth	Press release	N/A	I	X								X	
Smashed Skulls on Spikes Show Violence in Ancient Scandinavia	Antiquity	N/A	C		X				X				

Forbes title	Source	Hits	Individual (I)/Community (C) Case Study	Empathy /Sympathy (Vulnerable)	Macabre/Curiosity	Methods	Supernatural (S)/Unique (U)	DNA	Violence/War	Virus, Bacteria	Pathogen Evolution and Disease Dispersal	Specific Disease or Condition	Coprofites/Microbiome/Paleoparasitology
Suicide, Sacrifice, and Mutilations in Precolumbian Cemetery Questioned by Archaeologists	Latin Am/Antiq	N/A	C			X			X				
This Napoleonic Soldier Survived for Two Months with Horrific Facial Wound Following 1812 Battle	IJOA	N/A	I	X	X				X				
This Pregnant Medieval Woman with Head Wound “Gave Birth” in Her Grave	World Neurosurgery	N/A	I		X				X			X	
Tiny Mummified Girl Not an Alien, May Be Result of Fatal Birth Defects	Genome Research	N/A	I		X							X	
Two Dozen People Massacred at Ancient Swedish Fort, Archaeologists Report	Antiquity	N/A	C						X				
What Causes Lion Face Syndrome of the Skull?	Various	N/A	I										X

(X = present)

★ Full text of all articles can be found in Killgrove (2021)

(2) violence [including structural] or war (44%); macabre or curiosity (41%); vulnerable people/empathy and sympathy (26%); superlative or unique individual (18%); focus on or presentation of methods (8%); DNA analysis (7%); coprolites, microbiome, or paleoparasites (6%); and pathogen evolution or disease dispersal (2%). If we look at the top ten articles by popularity, however, the percentages change. In these most-read *Forbes* pieces, which represent 58% of all hits, 80% are individual case studies, 70% can be coded as macabre or curiosities, 60% coded as superlative or unique, 40% of the articles provide discussion of vulnerable individuals, 40% focus on violence or war, and 30% focus on a specific condition the individual(s) had. Both of these topical analyses, however, suggest that high-popularity news items are those that pique the public's curiosity about human differences and interest in transgressive deaths.

To explore further, we ran a Pearson correlation on individual words/phrases in the articles and their hit counts to see which words were positively correlated with the interest of the general public in the news article. Table 32.4 provides this correlation, separated into grammatical categories of noun, adjective, verb, and adverb. None of the Pearson statistics rises above a moderate positive correlation, but the correlative words that appear most frequently are interesting to note. For example, among the nouns, the word *life* appears in 52 documents and *people* in 55, while *burials* and *graves* appear in 33 and 19 news pieces, respectively. This suggests that popular paleopathology news articles are focused both on people's lived experiences and on their deaths. The category of adjective shows a Pearson correlation greater than 0.5 between hit count and use of the words *degenerative* and *strange*, while other adjectives that commonly appeared in popular articles include *pathological*, *longstanding*, and *intriguing*. These would seem to parallel the macabre/curiosity theme noted above. Action verbs such as *excavate* and *investigate* are moderately positively correlated with popularity of these *Forbes* articles, while basic demonstrative verbs *show* and *give* occur most frequently. Finally, the adverb *why* turns up in 18 articles and shows a moderate positive correlation with frequency, perhaps speaking to the themes of curiosity about and explanation of ancient disease.

Table 32.4 Pearson correlation of word frequency with popularity of *Forbes* articles

	<i>Word</i>	<i>Number of articles appeared in</i>	<i>Pearson correlation with hit count</i>
NOUNS	Scholar(s)	6	0.573
	Friend(s)	3	0.520
	Tuberculosis	6	0.402
	Perception	4	0.384
	Grave(s)	19	0.363
	Sense	4	0.343
	Correlation	4	0.332
	People	55	0.327
	Burial(s)	33	0.326
	Fear	3	0.323
	Ribs	15	0.307
	Life	52	0.306
	Trait(s)	3	0.303
	Student(s)	4	0.302

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	<i>Word</i>	<i>Number of articles appeared in</i>	<i>Pearson correlation with hit count</i>
ADJECTIVES	Degenerative	5	0.582
	Strange	4	0.539
	Pathological	11	0.385
	Disabled	4	0.368
	Longstanding	7	0.349
	Intriguing	8	0.336
	Alone	3	0.333
	Professional	4	0.327
	Lunar	3	0.306
	Respiratory	4	0.305
	Enslaved	3	0.301
VERBS	Excavate	5	0.461
	Admit	3	0.437
	Investigate	6	0.401
	Show	35	0.388
	Regard	3	0.385
	Call	7	0.356
	Born	10	0.340
	Give	35	0.324
	Wear	9	0.305
ADVERBS	Why	18	0.454
	Necessarily	5	0.405
	Certain	8	0.394
	Slightly	5	0.356
	Suddenly	4	0.319

The themes that arise from an inductive analysis of news article topics and correlative words, then, suggest that the general public is most interested in reading and sharing paleopathology news items that focus on past people’s lives and deaths, but particularly on those individuals who are deemed different, strange, or intriguing today or in the past.

Deductive Frame Analysis

A challenge raised by both Stojanowski & Duncan (2015:54) and the various scholars writing in the edited volume *Bioarchaeologists Speak Out* (Buikstra, 2019a) is for practitioners to contribute to larger societal discussions about topics that echo through time, such as warfare and violence, through outreach. Quantitative analysis of the *Forbes* pieces demonstrates that there is public interest in the topic of violence from a bioarchaeological perspective, so it is an ideal candidate for an issue frame analysis (cf. Touri & Koteyko, 2015). Loosely following the methodology of VanGorp and Vercruyssen (2012), key terms and phrases were extracted from the text using an open coding method in addition to linguistic elements suggesting a cognitive framework for the reader for each of the 47 paleopathology-focused *Forbes* pieces that dealt with violence. These frames were collapsed into broader logical categories and correlated with values and morals in a frame matrix (Table 32.5).

Table 32.5 Frame matrix for *Forbes* articles related to violence

Frame	Cultural/moral values	Common words and phrases	Conclusions...
1 Identification of an individual or group	Individualism Authority Self-reliance Loyalty	<p>PEOPLE: archers, assailant, diplomat, foreigners, king, ruler, soldier, troops, warrior</p> <p>LOCATIONS: battle, mass grave, combat, public, shipwreck</p> <p>ACTIONS: amputate, assassinate, beat, boil, cannibalize, conquer, cook, escape, explore, feud, fight, hack, imprison, inflict, penetrate, plunder, punish, raid, scrape, slash, smash, starve, strip, succumb, suffer</p> <p>DESCRIPTIONS: ambiguous, bound, brutal, chaotic, chained, conclusive, debilitating, difficult, frightening, furious, gruesome, haphazard, hastily, horrific, painful, political, shocking, surprising, tossed in, tragic, twisted</p> <p>ITEMS/RESULTS: buckshot, flesh removal, fracture, guns, injury, knife marks, musket, pot polish, trauma, weapon, wound</p>	<ul style="list-style-type: none"> Famous people are more interesting than unnamed folks of the past Osteobiography of individuals is compelling Historically important individuals within paleopathology are likely to have been warriors or soldiers
2a Broad, socially sanctioned violence (e.g., war, slavery)	Authority Betrayal Inequality Oppression	<p>PEOPLE: archers, casualties, children/infants, criminals, ethnic group, elites, foreigners/immigrants, gladiator, grave robber, heretics, hostage, Inca, Jews, labor force, raiders, rebels, regime, soldiers, victim, warrior</p> <p>LOCATIONS: battle, burial, fort, jail, mass grave, pyramid, temple, trash dump</p> <p>ACTIONS: abandon, autopsy, colonize, conquer, cut, defend, discipline, dissect, execute, kill, massacre, raid, remove, sacrifice, slit, stab, torture, toss, transition</p> <p>DESCRIPTIONS: angry, beheaded/decapitated, bloody, broken, brutal, carved up, charred, conclusive, contaminated, cracked, defleshed, dehumanized, demanding, different, difficult, disarticulated, discarded, diverse, economic, elaborate, enigmatic, extracted, fatal, genetic, ghoulish, gouged-out, gruesome, hard work, historical, improper, Indigenous, largest, marginalized, massive, medical, mistreated, mixed-heritage, modified, naked, nefarious, non-lethal, peaceful, poisoned, political, puncture, race, rotting, significant, split, systematic, terrifying, tied, unique, unstable, unusual, urban</p>	<ul style="list-style-type: none"> General empathy with the oppressed Understanding of the role of violence in sociopolitical systems

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<i>Frame</i>	<i>Cultural/moral values</i>	<i>Common words and phrases</i>	<i>Conclusions...</i>
		ITEMS/RESULTS: activity, ancestry, armor, blunt force trauma, child abuse, class differences, climate change, collapse, cut marks, DNA, genocide, hierarchy, injury, Inquisition, isotopes, power, pressure, ritual, rum, slavery, stress, surgery, sword, trauma, trepanation, weaponry	
2b Specific, public violence or torture (e.g., crucifixion)	Individualism Authority Degradation Oppression	PEOPLE: attacker, bog body, cadaver, defender, prisoner, soldier, victim LOCATIONS: battle, fort, ruins, spikes/stakes ACTIONS: beat, colonize, execute, penetrate, torture DESCRIPTIONS: amputated, bound, brutal, condemned, contorted, cracked, decapitated, dismembered, displayed, dropped, drugged, extraordinary, face-down, forced, healed, historical, humiliated, important, Indigenous, medical, murdered, naked, oldest, painful, pierced, preserved, public, rare, shallow, sharp, shattered, significant, slow, smashed, split, stabbed, unburied, unusual ITEMS/RESULTS: alcohol, armor, artery cut, blood loss, blunt force trauma, coca, cold case, crimes, fracture, injury, last meal, organ failure, punishment, swords, trauma, trophy head, vultures	<ul style="list-style-type: none"> • Specific empathy with the victim • Lack of understanding of oppressor's need to enact violence
3 Improper burial	Degradation Oppression Inequality	PEOPLE: criminals, ethnic group, fetus, foreigners, grave robber, heretics, Jews, victims LOCATIONS: burial, jail, mass grave, ruins, trash pit ACTIONS: autopsy, dehumanize, dissect, dump, excise, execute, hack, inflict, mistreat, punish, sacrifice, shoot, stab, torture DESCRIPTIONS: angry, bound, contorted, discarded, disturbing, enslaved, face-down, forced, gruesome, humiliating, improper, left to rot, marginalized, medical, outside, painful, pierced, pregnant, public, rare, shallow, shocking, slow, unusual ITEMS/RESULTS: arrowhead, climate change, crime, fertility, musket, trauma	<ul style="list-style-type: none"> • Dead bodies are different than other refuse • People deserve respect and dignity, even in death

(Continued)

<i>Frame</i>	<i>Cultural/moral values</i>	<i>Common words and phrases</i>	<i>Conclusions...</i>
4 Human nature is violent, but often as a last resort	Action Authority Care/Harm Practicality	PEOPLE: cadaver, victim, warrior LOCATIONS: battle, shipwreck ACTIONS: butcher, boil, cannibalize, chop, cook, cut, drop, eat, explore, grill, murder, prove, remove, scrape, smash, train, work DESCRIPTIONS: cold case, gruesome, horrific, injured, modified, oldest, shattered, tragic ITEMS/RESULTS: blood, blunt force trauma, brain, famine, knife marks, pot polish, recipe, skull cup, trophy head	<ul style="list-style-type: none"> • Violence has been with us since we evolved • But violence is often framed as a last resort, to preserve oneself or one's community
5 Transgression of "natural" order	Individualism Subversion Degradation	PEOPLE: hero, martyr, warrior, woman LOCATIONS: civilization, mass grave, pyramid ACTIONS: collapse, decapitate, sacrifice DESCRIPTIONS: elaborate, intersex, massive ITEMS/RESULTS: biology, DNA, gender, ritual, political power, social hierarchy	<ul style="list-style-type: none"> • Violence against the vulnerable (especially women and children) is frowned upon • Individuals who subvert the "natural order" of things are fascinating
6 Administering care in the past	Care Community Loyalty Fairness	PEOPLE: assailant, children, community, elite, fetus, Inca, military, nomad, soldier, warrior, community LOCATIONS: battle, fort, hospital, mass grave ACTIONS: abuse, combat, discipline, pierce, punish, reconstruct, succumb DESCRIPTIONS: amputated, brutal, decapitated/headless, disappeared, fertility, healed, historical, horrific, important, judicial, killed, massive, non-lethal, outside, pain, political, pregnant, scattered, severe, shot, unburied ITEMS/RESULTS: arrowhead, blunt force trauma, copper, fracture, knife, medical care, pressure, prosthesis, stress, surgery, survival, trauma, trepanation, trophy head, wound	<ul style="list-style-type: none"> • Families and social groups took care of their injured members
7 Past experts were wrong	Fairness Authority	WORDS: historical, mortuary ritual, mutilation, sacrifice, suicide, trauma	<ul style="list-style-type: none"> • Science is self-correcting

Because the *Forbes* column was written by an American for an English-speaking audience, we sought out literature from social psychology and American culture studies on values and moral framing, assuming the author would be communicating – intentionally or not – within this milieu. Haidt's (2012) moral foundations theory includes care (harm),

fairness (cheating), loyalty (betrayal), authority (subversion), purity (degradation), and liberty (oppression) as the most important categories of moral intuition, while Kohls' (1984) "values Americans live by" include equality, individualism, self-reliance, competition, optimism, action, informality, directness/honesty, practicality/efficiency, and materialism. We therefore assessed the 47 violence-focused articles, subjectively coding them with the above values and morals, and pulled out relevant keywords in order to create seven frames (Table 32.5), which we discuss here in order of popularity:

1. Identification of an individual or group. By far, the most popular *Forbes* articles by hit count included new information on historical individuals such as Philip II, Napoleon's soldiers, or the Franklin Expedition. This result correlates with a general American interest in crime scene investigation (CSI), forensic anthropology, and corpses (Folyn, 2008; Meyers Emery and Killgrove, 2015; Penfold-Mounce, 2016; Buikstra, 2019b). The cultural values influencing this frame include authority and loyalty to political or military figures, as well as themes of individualism and self-reliance. We can surmise from this frame that the *Forbes* readership felt that celebrities were more interesting than average people of the past, that osteobiography of these individuals was compelling, and that historically important individuals within paleopathology were likely to have been warriors or soldiers.
- 2a. Broad, socially sanctioned violence. The second most popular frame was that of socially sanctioned violence, which we split here into a collective category (e.g., war, slavery) and a more individual one (e.g., crucifixion, sacrifice). From the word list, it is evident that the actors relevant to this framing included groups engaging in the violence, such as *archers* and *raiders*, and those subject to violence, such as *hostages* and *children*. Descriptive words used in these articles, such as *ghoulish* and *genocide*, are evocative of the scale of violence being reported. Values displayed in this framing include authority (noted in frame 1 above), but also betrayal, inequality, and oppression. Although this frame elicits empathy with oppressed groups, it does not reflect values noted by researchers in social psychology and American culture studies, which include care, fairness, and equality.
- 2b. Specific, public violence or torture. The noted popularity of articles referencing socially sanctioned violence may be correlated with the uniqueness of the deaths – crucifixion, trophy heads, and sacrifices – which can pique morbid curiosity. Descriptive words reporting the violent events ranged from neutral (*amputated, unburied, rare*) to evocative and potentially triggering (*forced, naked, humiliated*). The values in this frame are similar to 2a but with an important addition: degradation, which is antithetical to the American value of purity and also opposed to the concepts of fairness and care. With this addition, readers' empathy towards the victim is evoked, as both reader and victim fail to understand the motivations of the oppressor.
3. Improper burial. Articles on mass graves are popular with readers, as are pieces indicating mistreatment at death (e.g., being bound or buried face-down). Words such as *unusual* and *shocking* were employed to signal that, even within the context of a particular culture, various types of burial were anomalous. Three actions in opposition to common American values are evident: degradation, oppression, and inequality. Readers are encouraged to conclude that all individuals deserve dignity during life and in death, and that human remains should not be treated as refuse.
4. Human nature is violent, but often as a last resort. Several articles framed violence as integral to human nature, but most often elicited in dire circumstances or as a last resort. These news items included terms such as *pot polish* when focused on the topic of

cannibalism and *skull cup* and *trophy head* to communicate the violence inherent in war. By considering violence a part of human nature, this frame appeals to the values of action and practicality, while violence as a last resort displays a struggle between the value of care and its opposite, harm.

5. Transgression of “natural” order. Some articles fit into a transgressive frame, focusing on rebellion, exemplified by articles on an Amazon warrior woman and an intersex Revolutionary War hero (see Killgrove, 2021 for full text). These articles signal the value of individualism, but also subversion of what many readers would consider to be “natural” categories like sex/gender. This frame further suggests to the reader that violence against vulnerable bodies, especially women and children, is not acceptable.
6. Administering care in the past. With the rise of the bioarchaeology of care approach in recent years (e.g., Tilley, 2015; and see Chapter 25 this volume), a growing number of publications have identified skeletal evidence of care in past populations. The articles within this frame elicit values of fairness and loyalty, in addition to care and community, which lead the reader to conclude that social groups in the past acted similarly to those in the present.
7. Past experts were wrong. Only one paleopathology article fit this frame, but this was a theme in non-paleopathological news items in the *Forbes* column. While American school children are generally taught that science is self-correcting, the reality of published academic science is much more complicated (Peterson & Panofsky, 2021), and the public’s understanding of the scientific process is often poorly informed (Kennedy & Hefferon, 2019). This frame demonstrates to the reader that values of fairness and authority are relevant within science.

Deductive issue frame analysis has provided clues to seven broad themes that Killgrove used to help *Forbes* readers understand the topic of violence in the past. Values of individualism and authority run through many of the top posts on the paleopathology of violence, to contribute to how past individuals’ lives are framed. Adding in the anti-values of degradation and oppression, readers were pointed to different or strange deaths in the past, echoing results from the inductive analysis. The moral dichotomy between the value of a human life and the harm in taking one was communicated to readers, along with challenges to readers’ cultural assumptions versus scientific realities.

The sample of Killgrove’s *Forbes* articles in this analysis – 108 full-text news items over a 4.5-year span – is far larger than that found in other popular news sources or press release outlets such as *Science Daily*. While this sample represents the interest of over 3 million readers of paleopathology news, there are a couple of major caveats. First, using a single-author site is not without bias. Killgrove writes, as we all do, through a personal lens. Her writing, including her linguistic predilections and her values as, for example, an American, a woman, a mother, and a bioarchaeologist, all influence her perspective. A similar critique has been raised about Margaret Mead’s *Redbook* column, which totaled 108 pieces and 3 million readers over 16 years (Shankman, 2018). Nevertheless, in her *Forbes* column, Killgrove intentionally directed attention away from the traditional research university press bias, and focused on work and expert commentary from early career researchers, BIPOC scholars, geographically diverse scholars, and from a wide range of institutions (Killgrove, 2019b). The second important point to address is that the hit count of an article is influenced by external factors such as date and time of release, promotion by *Forbes* itself, appearance on social media, and search engine optimization (SEO). Low hit counts can also be linked to churnalism – when a larger and more popular news outlet summarizes a published story and promotes it to their own audience. In

these instances, people are more likely to share the churned article than the original piece, thus obscuring its popularity rather than reflecting lack of interest (see Killgrove, 2019a).

While the above analysis may help us better understand what the general public finds interesting about paleopathology and the way that that information is framed, it does not address impact, which is a point raised by Stojanowski & Duncan (2015) and addressed directly by all authors in *Bioarchaeologists Speak Out* (Buikstra, 2019a). Hit count or article popularity is a weak proxy for impact; it shows that we have been able to capture the public's imagination about ancient bodies but not what the public *does* with that knowledge. If we want bioarchaeology in general or paleopathology in particular to “directly engage policy debates on topics such as violence, gender, health policy, and matters of the body” (Stojanowski & Duncan, 2015:58), we need to address this goal specifically. Moving forward, anthropologists interested in conveying their research on ancient violence to the general public, for example, can learn from this popularity-mediated issue frame analysis that the values of individualism, liberty, and authority are useful ways to present their work for maximum interest.

Incorporating interdisciplinary methods and theory into public outreach is therefore an ideal place to start, particularly in understanding how ideology frames a discussion, a topic popular as far back as the 1980s, when archaeologist Mark Leone reframed patterns of thought and meaning as the “givens of life held unawares” (1982:742). As an example, a recent paper by Sarah E. Jackson and colleagues (2020) used computational meta-analytical techniques to survey the text of nearly 600 published archaeology journal articles for language that practitioners used to discuss “bone.” Their multi-method analysis revealed that bone was discussed in regular and patterned ways, often as an extension of the body in general, but additionally as fragmentation, parts, and objects. More importantly, they were able “to uncover indications of scholarly assumptions and beliefs about bone, not all of which are overtly acknowledged or expressed” (2020: sect. 7.1, para. 2). There is a new opportunity, they argue, to investigate textual datasets at varying scales using machine learning techniques in order to engage more fully and reflexively with the narratives that make up our field of research.

What additional tools might communications researchers, journalists, museum interpreters, assessment and evaluation researchers, and policy experts have that would help us better market our discipline and, more importantly, understand its impact on the contemporary world? We argue that any analysis of public perception of our field should be done in an interdisciplinary and systematic way if we wish to understand what topics are newsworthy and how we can better educate the public on the importance of paleopathology. Tapping into this rich vein of research and methodology is a necessary next step, as it will help bioarchaeologists translate our conclusions about the past into impactful public policy in the present.

Current and Future Outreach

Over half a century ago, John Fritz and Fred Plog wrote that “unless archaeologists find ways to make their research increasingly relevant to the modern world, the modern world will find itself increasingly capable of getting along without archaeologists” (1970:412). Archaeology is, of course, still here, and outreach practitioners have ably pivoted in the last decade to the “fragmented future” of Web 2.0 (DiNucci, 1999), highlighting user-generated content on blogs and social media accounts communicating news.

Today, though, podcasts have grown immensely in popularity, with more than 40% of Americans over the age of 12 having listened to at least one podcast episode in the past month (Shearer and Liedke, 2021). With a low barrier to entry – a microphone and recording device are the main tools needed – podcasting has given many anthropologists their own channel

of communication. One excellent example is bioarchaeologist Michael Rivera's *The Arch & Anth Podcast* (<https://archandanth.com/>), which ran for 150 episodes from May 2019 to July 2020. Rivera interviewed anthropologists from around the world working in all subfields, for a fantastic snapshot of the diversity of research and researchers in the field. His podcast reached up to 10,000 listeners per month in over 100 countries (Rivera, 2020). Another example is *The Dirt* (<https://thedirtpod.com/>), an ongoing podcast started in July 2018 and hosted by zooarchaeologist Anna Goldfield and archaeologist Amber Zambelli. Their episodes cover a wide range of topics, such as “mythbusting,” the archaeology of childbirth, human remains trafficking, and disability and queerness in archaeology. A newly created podcast called *Digging to the Other Side* (<https://anchor.fm/diggingtotheotherside>) was developed in 2022 by “Asian-hyphenated archaeologists” to communicate how they approach and are approached by the field of archaeology. Wenner-Gren's *SAPIENS* outlet has its own podcast as well (<https://www.sapiens.org/podcast/>). The current Season 4 – “Our Past is the Future” – is hosted by Ora Marek-Martinez and Yoli Ngandali, who are exploring how Black and Indigenous people are helping change archaeology research. And the long-running *Sausage of Science* podcast (<https://www.humbio.org/podcasts/>) sponsored by the Human Biology Association is hosted by Cara Ocobok and Chris Lynn, focusing on the work of graduate students and early career researchers. As a final example, when the COVID-19 pandemic shut down her opportunities to engage in classroom outreach, bioarchaeologist Myeashea Alexander, the “Rockstar Anthropologist,” created a YouTube series called *Science & ...*, where she talks to STEM researchers about their interests and work outside of academia (<https://therockstaranthropologist.com/announcing-science-and-a-new-series/>).

As public outreach in anthropology continues to move away from the more traditional and unidirectional outlets of print, online news, and public talks and moves towards diverse, community-based, and interactive engagement, we are hopeful that paleopathology will lift up new voices and new forms of outreach. It remains difficult, however, for people within academia to get outreach to “count,” even as anthropologists in general admit that engagement benefits everyone (Menear, 2017; Killgrove, 2019a; Tommy and Hawks, 2021). Rewarding these anthropologists, particularly those early in their career, for trying something new is critical for the ongoing evolution of outreach.

Twenty years ago, Charlotte Roberts wrote that “we must also promote our [paleopathology] studies through the media, whatever we think of that opportunity, because it is through informing the public of our work that we can show its value” (2002:15–16). In spite of our disciplinary hand-wringing on communicating the value of our work over the past several decades, we have shown in this chapter that paleopathology outreach is increasing over time, and we remain optimistic that 21st-century practitioners will continue to blaze a clear path forward.

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