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RESEARCH ARTICLE

Ancient DNA research may be conducted in the absence of consent from descendant communities

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Abstract

Background: *Ancient deoxyribonucleic acid (aDNA) research studies the genomes of human ancestors. Since the archaeological remains that carry this aDNA are often those of the non-living ancestors of living humans, one less explored question is whether aDNA research ought to be permissible in the absence of informed consent of descendant communities. We interrogate this question.*

Methods: *To address this question, this paper is a primarily conceptual paper that draws on moral norms arising from pre-existing — albeit competing — formulations of harmony in African moral philosophy. This methodological approach is not uncommon and has been accepted as a valid research method.*

***Results*:** *The paper's methodological approach yields the conclusion that it is ethically permissible to conduct aDNA research on human archaeological remains in the absence of informed consent from descendant communities or individuals. Although we justify the ethical permissibility of conducting research without consent, we also emphasise the importance of consultation with descendant communities — where they are known — and the researchers' responsibility to share benefits with them before, during, and after aDNA research.*

Conclusion: *The sort of aDNA research that this paper considers permissible is that which is likely to enhance harmonious relationships in relevant ways. aDNA research is advancing rapidly and in proportion to technological advances. To ensure that aDNA research in a more technologically advanced world is undertaken in ethically permissible ways, global research guidelines would be required. Future studies can focus on articulating such guidelines.*

Keywords: : *aDNA research; Global South; harmony; African moral philosophy*

Introduction

Ancient deoxyribonucleic acid (aDNA) research is the study of genomes from the ancestors of humans [1]. Scientists can trace human evolution and get vital information about present-day individuals using aDNA [2]. Human archaeological remains that carry this aDNA are often those of the ancestors of living humans or of their descendant communities. Descendant communities are related to the ancestor and are indigenous to where the ancestor was buried. It is worth critically interrogating whether aDNA research ought to be permissible in the absence of informed consent of descendant communities and where the ancestors' preferences — or consent — are unknown. This is important, given the capacity to harm descendant communities.

There are many ways aDNA research can cause harm to entire descendant communities or specific individuals, including reigniting colonialism, causing social conflict by instigating hatred among descendant communities and researchers, incorrectly characterising them to the public, misrepresenting or disrespecting their family's religion, culture, or traditional values, or breaching the descendant communities' privacy or confidentiality. One example of this is the erroneous classification of the Ta'ino people as "extinct", following the reconstruction of parts of the Ta'ino genome from aDNA [3].

Furthermore, most aDNA research rarely follows the key conditions for ethical research. Certain aDNA research practices are normalised which often fail to consult with or seek the informed consent of descendant communities. One of many examples is the research done on HeLa cells from Henrietta Lacks. Scientists worldwide have been using Henrietta Lacks' cells to advance scientific and biomedical knowledge ever since she succumbed to cervical cancer at the age of 31, in 1951 [4]. Her cells were sold and used in ways that produced enormous profits for many businesses, while also advancing research on AIDS, cancer, and the polio vaccine. The Lacks family were never consulted or informed about the research, and did not directly gain from the benefits it produced, although this may change

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following a recent court judgment that has now mandated a biotechnology company to compensate the family [5].

This yields the conclusion that in addition to interrogating whether aDNA research can be permitted without informed consent, it is worth outlining suitable guidelines for conducting aDNA research outside the active involvement of descendant communities. Establishing unambiguous ethical norms can direct future research practices and support the appropriate conduct of research and science in this rapidly advancing field, instead of focusing only on discussing its ethical implications.

Some guidelines favour researchers' interests over descendant communities' by indicating that robust scientific studies should still be conducted even if it conflicts with the descendant communities' concerns. In several regions, such as Brazil and Sudan, research guidelines acknowledging such concerns are missing [6]. Pressing challenges remain regarding how aDNA research should be conducted in low- and middle-income countries, given these regions' weak research governance structures [7]. Providing an ethical lens for thinking about and negotiating challenges raised by aDNA research could be essential to honour communities and their ancestors in such regions.

There are many ethical reflections on whether aDNA research should be conducted without consent from the communities or surrounding communities where archaeological samples were collected, and how such research may be performed. Notable scholars who have contributed to this question include Soren Holm [8], Frederika Kaestle and Ann Horsburgh [9], Songül Alpaslan-Roodenberg et al [6], Emma Kowal et al [10], and Bernado Yanez et al [11], to name a few. However, African perspectives are missing in these reflections. This paper hopes to fill this gap, drawing on the concept of harmony in African moral philosophy to interrogate whether aDNA research may be conducted without the informed consent of descendant communities or individuals; and if yes, how.

There may be different scenarios regarding descendant communities or individuals: (i) the descendant communities are identifiable; (ii) there are two or more descendant communities that wish to be informed, which may complicate the process; (iii) there is no established connection between descendant communities and the ancestral remains that were found, implying that first, aDNA research must be conducted to identify descendant communities; (iv) there is no descendant community; or (v) the ancestral remains are ancient fossils and may be linked to several descendant communities. This paper demonstrates the implications of the key value it has drawn on for each of these scenarios.

Research design and method

This paper's research design deserves an explanation. It is primarily normative and utilises a key value — harmony in African moral philosophy — to respond to the question: "Is it ethically permissible to conduct aDNA research in the absence of informed consent of descendant communities, particularly in contexts where preferences of the ancestors are unknown? If yes, then how?"

This paper's normative approach is not uncommon and has been accepted as a valid research method [12]. Notably, the paper draws on moral norms arising from pre-existing, albeit competing, formulations of harmony in African moral philosophy to argue that it is ethically permissible to conduct aDNA research on human archaeological remains in the absence of informed consent from descendant communities or individuals. Although this paper justifies the ethical permissibility of conducting research without consent, it also emphasises the importance of consultation with descendant communities — where they are known — and the researchers' responsibility to share benefits with them before, during, and after aDNA research.

In the first section, the paper articulates moral norms that can arise from existing formulations of harmony, mainly in the works of African philosophers. The second section draws on these norms to defend its thesis. The final section addresses different potential objections.

To retrieve relevant material, the authors conducted a non-systematic search in databases like PubMed, Google Scholar, and the Wits Library database, using key phrases such as "aDNA research and ethics", "Afro-communitarianism and research ethics", "aDNA research and African moral philosophy", "ancient DNA", "descendant communities", "consent", and "consultation". These search terms turned up more than 250 useful materials that were critically analysed. These materials included newspaper articles, journal articles, book chapters, and books.

The methodological choice to draw on an African moral philosophy also needs justification. This paper uses African moral philosophy to describe values such as communal relationships, which are more prevalent in Africa. Africa "[harbours] the greatest human genetic diversity on the planet" [13]. More aDNA research is happening on this continent than in the Global North. It seems intuitive to respond to ethical questions raised by aDNA research on samples collected from Africa with perspectives from Africa. Inviting these perspectives is an essential way of respecting Africans as "knowers" and valid contributors to knowledge systems that are featured in ethical reflections on the permissibility of aDNA research — at least on African samples.

Components of harmony in African moral philosophy

Many African scholars consider harmony a key value in African moral philosophy. Kwame Gyekye "considers the community as a fundamental human good" and therefore "advocates a life lived in harmony and cooperation with others, a life of mutual consideration and aid and of

interdependence, a life in which one shares in the fate of the other" [14: p 17].

One core component of harmony is that it is a combination of two values: identifying with others and exhibiting solidarity [15]. "Identifying with others" requires a person to behaviourally and psychologically share a way of life with them. This attitude includes the propensity to refer to oneself as a "we" rather than an "I", and to regard oneself as interconnected to others, as well as feeling pride or humiliation in what one's group or another group does. Being upfront about the terms of an engagement, letting people form their own judgements, behaving in a way that fosters trust, and eventually, making other related decisions with the knowledge that these decisions define who we are.

On the other hand, "exhibiting solidarity" requires doing what one can to foster the well-being of others. This view is also supported by Archbishop Desmond Tutu [16]. Exhibiting solidarity would entail supporting another person's welfare and empathising with their situation. Solidarity can take many forms, including social movements, group efforts to foster another's good for its own sake, lending a helping hand to those in need, and accepting responsibility for each other's quality of life. Along with appreciating each person's intrinsic worth and dignity, solidarity implies actively trying to create a society that is more inclusive and egalitarian.

The moral norm this combination gives rise to is that an action is right to the extent that it brings individuals together, rather than separating them.

Second, harmony is also sometimes related to friendliness. As Thaddeus Metz [17: p. 84] expounds:

> *the combination of sharing a way of life and caring for others' quality of life, or what is the same, of identifying with and exhibiting solidarity toward others, is basically a relationship that English speakers call 'friendship' or a broad sense of 'love.' So, it also follows that the present moral theory can be understood to instruct an agent to respect friendly relationships and especially to avoid prizing ones of enmity.*

In the ethics of friendliness grounded in African moral philosophy, the duty to end unfriendliness is more morally significant than the duty to promote new friendliness. Unfriendliness involves failure to identify with others or exhibit solidarity. Furthermore, friendliness ought not to be promoted through unfriendly means. This deontological formulation of friendliness prevents this philosophy from becoming authoritarian. For example, one ought not to coerce individuals who have not acted in an unfriendly manner, even if doing this will deepen a harmonious relationship. Notice that friendliness is not always immoral and is permitted if it is required to end proportional unfriendliness, as in the case of self-defence. This is supported by Godfrey Tangwa, who emphasises that harmonious relations can be maintained through compromise and constraints. Others can morally constrain one's autonomy and freedom to end aggression [18]. A culture can be communal by acknowledging the importance and distinctiveness of each individual while also confirming the community's superiority over the individual.

The moral norm that arises from this description of friendliness is that one ought to reciprocate others' friendliness. This also includes exhibiting proportional unfriendliness towards individuals who have been unfriendly [19].

Third, in many formulations of harmony in African moral philosophy, harmony — or the capacity for the same — is often required for developing personhood. Although some African scholars consider that one becomes a person through biological birth, many other scholars believe that the idea of personhood is varied and nuanced, that it goes beyond simple biological existence. In this regard, personhood must be differentiated from being human. While biological birth is sufficient for being human, it is not sufficient for gaining personhood. Ifeanyi Menkiti [20] explains that personhood is a status one acquires through acting in specific ways. In his analysis, Menkiti [20] claims that the African conception of an individual rejects the idea that people may be categorised according to a single individual's set of physical or psychological traits. Instead, a person is defined in reference to their encompassing community. This is how an individual develops their personhood.

Similarly, taking the maxim "I am because we are, and since we are, therefore I am" as his starting point, John Mbiti [21] remarks that the definition and realisation of personhood takes place within the framework of community. Personhood highlights how people are interdependent on and related to one another; it develops through interpersonal connections. Also, refer to the following comment by Desmond Tutu: 'We say "a person is a person through other persons." It is not, "I think therefore I am." It says rather: "I am human because I belong. I participate, I share..." Social harmony is for us the *summum bonum*––the greatest good.' This expression captures the notion that interactions and harmonious relationships profoundly impact the conception of personhood.

Fourth, harmony is sometimes related to moral status. Moral status establishes whether people are entitled to rights, deserving of respect, or need to be subjected to specific ethical requirements. "Something has moral status insofar as it can have a certain causal or intentional connection with another being" [22; p. 394]. To have a moral status means to be "capable of being a part of a communal relationship of a certain kind" [22; p. 394]. According to a modal view of moral status, being both the subject and the object of harmonious relationships is essential for having a complete moral status. A typical adult human will have a complete moral status. Entities that others have harmonious relationships with have partial moral status. An example of this is a pet. Finally,

there is no moral status for entities that cannot be the subjects or objects of harmonious relationships. An example of this may be a pen [23].

Finally, harmonious relationships are sometimes used to express the idea of "cosmic unity" that embraces all lives in the physical world and in the spiritual realm [24]. Some scholars understand the physical and spiritual worlds as a continuum. Nhlanhla Mkhize [25] emphasises that the African ethic of harmony can only attain success if an intricate balance in the cosmos — both in the spiritual realm and the contemporary physical cosmos — is maintained: "The notion of being in harmony with one another and the universe… is best explained through the principle of cosmic unity, and human wrongdoing, unethical conduct, or social injustice destabilizes this order." Therefore, we should strive for harmonious relationships with those in the physical world and in the spiritual world of ancestors and spirits. Augustine Shutte [26] points out that ancestors and the unseen world are essential parts of a community. Birth brings a person into the world, and death does not break that link. According to this belief, God is the centre of the earth, and each person who passes away draws nearer to God. The deceased continue to influence earthly life after they are buried. Even after they pass away physically, ancestors and the world unseen are still regarded as members of society in African traditions [27].

To sum up, to maintain harmony, we ought to consider not just the present physical community but also the deceased, as they are also part of the community, although not physically present.

Harmony in African scholarship and its implications for aDNA research

The dilemma present in this research question describes the conflict between an ethical obligation to respect the desires and values of descendant communities and the duty to advance science. As we demonstrate, it is, in fact, possible to advance science without disrespecting the reverence that descendant communities (where they are known) have for their ancestors. Let us suppose that individuals have personhood by virtue of harmonious relationships. Let us also suppose that one reason for conducting aDNA research is to increase our understanding of disease progression and prevention. In that case, conducting aDNA research without the informed consent of known descendant communities seems permissible, since disease undermines harmonious relationships. By undermining harmonious relationships, diseases also undermine how individuals have personhood or moral status. This ought to be prioritised over any requirement to seek their informed consent. Moreover, individuals have the right to informed consent on account of their personhood or moral status, which is diminished when their capacity for communal relationships is compromised.

Notice that this argument does not negate the importance of approval from the relevant ethics committees or regional government. When descendant communities are unknown, approval from appropriate bodies is mandatory. Importantly, government authorisation and ethical approval should be sufficient when the descendant communities refuse to consent, assuming that it could be demonstrated that the aDNA research in question will advance the descendant communities' personhood.

A critic may ask: Who is most qualified to judge what would further one's interests, values, beliefs or benefits? In response, this paper acknowledges that the individual concerned — where the descendant communities are known — would ideally know what is in their own best interests. Nonetheless, governments also enjoy a *parens patriae* power — following sound judgement — to act in the best interests of citizens, and can make these decisions on their behalf, including deciding what would promote their wellbeing.

Another critic could press further and contend that a government may abuse its power and act in a manner that is not in the best interests of the people it serves. Seeking informed consent of the community would be a way to counter this likelihood. Informed consent of the community also recognises their autonomy in defining their wellbeing and benefits. Notice that this is not a problem with the philosophy that this paper draws on, since it says that an appropriate way to exercise the power of *parens patriae* would be to behave in a way that is in the best interests of the people. When a government does not behave in a way that is in the best interests of the people, the government is abusing its authority.

Note that descendant communities can also fail to act in their own best interests. Classical examples include slavery and discrimination against Black persons or women. From the point of view of the philosophy this paper articulates, "best interests" entail acting in ways that create harmony among people. The harm of slavery and discrimination is that they alienate individuals and/or their experiences. In this instance, however, a government can exercise the power of *parens patriae* effectively and in the community's best interests by eliminating communal structures that ennoble discrimination

Although the moral norms arising from personhood may reasonably permit aDNA research without informed consent, it would be impermissible to conduct aDNA research without consulting descendant communities, especially when they are known. Ancestors are highly revered entities with whom descendant communities have a special and intimate relationship. This suggests that the viewpoints of descendant communities should be sought through consultations with the community on the purpose of the aDNA research, and how such research could deepen their lives or enhance their personhood. On this account, aDNA research is morally permissible if it enriches a community's interconnectedness. On the contrary, aDNA

research that fails to deepen this relationship would be immoral.

Although the concept of personhood espoused in harmonious relationships may not justify the necessity of seeking informed consent, it reveals the benefits of consulting with descendant communities before research. It allows researchers to learn directly from the community how their ancestors' remains ought to be handled, and the reverence with which it should be done. This may provide insights on how aDNA research can be conducted in ways that respect the descendant communities' traditions, even without taking their informed consent. Descendant communities frequently have distinctive knowledge, customs, and beliefs about their ancestors. Consulting these communities will enable researchers to have a deeper comprehension of their research environment, preventing any potential misunderstandings or disrespect.

Second, the idea that harmonious relationships entail identifying with others and exhibiting solidarity also yields this conclusion. Notice that the main moral norm that arises from this combination is that an action is right to the extent that it unites — rather than divides — individuals. aDNA research can unite individuals when undertaken for the purpose of building harmonious relationships. For example, it can establish common ancestries among communities, providing greater justifications for these communities to identify with one another and act in ways that can improve each other's quality of life. This would be pertinent in a situation where the ancestral remains cannot be identified with any community, or instances where several communities dispute the ownership of the remains. In these instances, aDNA research can be a way to establish ties that bind such people together and across generations.

Also, aDNA research may provide greater insights into people's social history, migration, and population, and even medical history. Researchers can decipher descendant communities' migration patterns, population movements, and linkages between various societies within their communities by analysing genetic data from ancestral remains and, in the process, foster cohesion among societies that share the same ancestry.

Implications for narratives that have ignored descendant communities' histories or exaggerated their contributions could be huge. Understanding ancestry through aDNA studies can help us understand why descendant communities have health inequities, or how infectious diseases are transmitted. Scientists can then create specialised therapies and healthcare plans by detecting genetic predispositions to diseases or vulnerabilities.

To sum up, aDNA research could help descendant communities grapple more intelligently and accurately with the present by improving their comprehension of the past.

In addition, aDNA research can enrich the history of certain tribes and cultures, and larger communities, and even advance medical knowledge. The broader community might develop a more profound respect for certain tribes within it from such research. This would deepen the connection between descendant communities and the broader community, promoting harmony. The point here is that aDNA research in the absence of informed consent may be permissible, assuming that the anticipated benefits — particularly for the descendant communities, but also for the larger community — outweigh potential harm. It is important to clarify that the conception of benefit grounded in harmony is not limited to health benefits but also includes increasing the opportunity to deepen relationships and honouring how individuals have moral status/personhood.

From the African philosophy point of view, something is beneficial if it fosters people's well-being; for example, boosting harmonious relationships they are involved in. The value of "benefit" can be conceptualised as: (1) enabling favourable health outcomes, since illness can undermine communal participation; (2) intensifying relational life by strengthening bonds, promoting knowledge, increasing understanding, and enhancing interactions between descendant communities and larger communities; and (3) honouring the fact that individuals have a status, personhood or dignity. This partly consequentialist reading differs from mainstream utilitarianism, which considers that certain individuals' good may be ignored if the majority benefits. Here, the paper contends that the risk/benefit calculation applies to the descendant communities primarily, and only secondarily to non-descendants. In this case, the descendant communities would not be a tool used to benefit others. Helicopter research is unjustified on this account, since it involves using certain communities as sites for research that would otherwise be impermissible in the researcher's home country. Also known as "parachute research", helicopter research describes a phenomenon whereby researchers fly into a country or region to conduct research that would not be permitted in their own home country/region.

Third, undertaking aDNA research without informed consent should not violate the ethics of friendliness, as espoused by the value of harmony. This ethic requires one to reciprocate friendliness to those who have been friendly, as well as exhibit proportional unfriendliness towards individuals who have been unfriendly. This paper justifies conducting aDNA research in the absence of informed consent as one way of exhibiting unfriendliness towards individuals who have also been unfriendly in a proportionate way. Let's assume researchers have consulted with the descendant communities regarding their aim. Let's also assume that the goals of the aDNA research deepen harmonious relationships. However, the descendant communities still refuse to grant consent for such research. In that case, this is a form of unfriendliness on the part of the descendant communities, since they are rejecting the opportunity to enjoy deeper relationships with one another. In this regard, the community acts in ways that undermine its well-being.

A critic may point out here that it is not unfriendliness if descendant communities are already enjoying harmonious relationships with one another. Notice that in this philosophy, enjoying harmonious relationships with others is not sufficient. Rather, one must seek to intensify that relationship. As Augustine Shutte [26; p 30] remarks, "Our deepest moral obligation is to become more fully human. And this means entering more and more deeply into community with others." Additionally, consider this statement: "The core of improving others' well-being is a matter of meeting their needs, not merely basic ones but also those relevant to higher levels of flourishing, eg, being creative, athletic, theoretical" [28; p 182]. To neglect seeking out higher levels of harmonious relationships is, in fact, a form of unfriendliness that can be countered by proportional unfriendliness. For this reason, aDNA research, even with the informed consent of the descendant communities, would be impermissible if it cannot increase opportunities for deeper levels of harmonious relationships beyond what individuals currently enjoy.

Additionally, aDNA research that increases the opportunities individuals have for communal relationships would also be impermissible if such research was done in ways that disrespected the culture, traditions, and beliefs of those ancestors and their descendant communities. This would be using unfriendliness to promote friendliness. For example, in Islam, it is deemed taboo to dig up the graves of the deceased and to extract DNA from the dead body, unless it is for a beneficial cause. An example of such a cause would be conducting an autopsy to determine the official cause of death, to identify whether any medical malpractice was involved in the death of the deceased [29]. Digging up an ancestor's grave without any beneficial cause would be immoral, at least from this perspective.

One way of using positive means to promote friendliness is by ensuring that the research process respects the community's interests and values through frequent consultations with them before, during, and after the research. The results of aDNA research can greatly impact descendant communities' societies and perhaps cause hatred or anger. The emotional health and dignity of the community members can be severely impacted by cultural appropriation, the commercialization of human remains, or disrespectful treatment. In order to recognise potential hazards and reduce them, researchers ought to consult with the descendent communities. This helps to prevent harm and promote ethical research procedures.

The reader will note that the friendlier action would be to obtain the descendant communities' consent because, in a way, researchers are respecting descendant communities and caring for them by acknowledging their autonomous capacity and familial ties to their deceased ancestors. Suppose the descendant communities refuse to grant this consent. In such a scenario, aDNA research would be ethically permissible only when the research would benefit the community more than it would harm it.

Is the analysis skewed?

This section and subsequent ones address potential objections. A critic may contend that this paper has mostly focused on scenarios where the descendant communities are un/known, neglecting contexts where there are two or more descendant communities that wish to be informed about the conduct of aDNA research. The ethics of harmony would require that conflict should be avoided in scenarios where hatred and anger can be created due to a failure to obtain consent from either community. In this situation, aDNA researchers must consult with both communities who wish to be informed. This paper acknowledges that this may require a substantial amount of effort and may be time-consuming, especially if descendant communities consist of many people and refuse to be consulted through representatives. Nonetheless, it is what this philosophy mandates.

To mitigate the challenges this process may impose, aDNA researchers can encourage each descendant community to elect a representative. This person will consult with the scientific community and relay information promptly to their descendant community and vice versa. The aDNA researchers can also provide periodic updates to the community at an assembly that its members widely attend. Recognizing the distinct cultural sensitivities of each descendant community is necessary for respectful consultation. Before undertaking aDNA research, scientists should learn about both communities' concerns over the sampling process, data processing, and prospective reburial or repatriation of remains.

Harmony would also mean that there ought to be opportunities for researchers and descendant communities to learn from one another, improve comprehension of scientific principles and cultural norms. When doing an aDNA study, scientists should take care to clear up any misunderstandings or misperceptions that may develop while speaking with descendant communities. Scientists should also attempt to establish trust with descendant communities. It is important to note that if a conflict arises due to frequent disagreements between descendant communities, harmony justifies continuing aDNA research without obtaining informed consent from those descendant communities. However, descendant communities still need to be updated about the aDNA research.

In the event that there is no established connection between descendant communities and the ancestral remains, the primary goal of aDNA research ought to be to identify its descendant communities. If there are no governments or ethics committees in the region, scientists ought to attempt to identify different traditional and cultural

tribes in the area close to where the remains were buried. When people are buried, there is a name written on either the tombstone or the headboard next to the grave. Scientists could try to identify which cultural tribe or religion the person belongs to, thereby confirming the race or religious status of the descendant communities. Scientists could then try to identify if any people around the area have the same surname by consulting with relevant cultural or religious authorities.

If all else fails — such as cases where random remains are found with no details of the deceased — then harmony would entail that aDNA research ought to still be conducted. However, this can only happen if the scientists want to do aDNA research that could benefit the broader community, such as increasing harmonious living and learning more about medical history, migration, or traditional history. Consultation must be emphasized once the research reveals who the descendant communities are.

In events where descendant communities are unknown but there is a regional government or an ethics committee present, the government can serve as a proxy community. This proxy community could also be a hierarchical structure governing aDNA research in the specific country/region. In these situations, proxy communities can act as a go-between, speaking for the needs and interests of the descendant communities. They can contribute their cultural, traditional, and religious expertise and understanding of historical context to assist with interpretation of the results. Proxy communities can offer insights and views that might not otherwise be available or may be overlooked. It is assumed that proxy communities will respect the values and beliefs of the descendant communities.

Situations may also arise where the remains may be linked to several descendant communities, possibly over a thousand. The consultation process would then become extremely complex and time-consuming, and aDNA research may not even be conducted due to the large number of descendant communities that need to be consulted before research can begin. In this case, one or two proxy communities should be consulted — such as governing structures of aDNA research close to where such remains were found. The process of the aDNA research should also be made public to ensure all descendant communities are made aware of what is happening. The public can trust that research is being conducted ethically when research techniques, data, and findings are made public. For the public to support scientific pursuits, trust is crucial.

Finally, situations may also arise where aDNA research studies are carried out on fossils. In such situations, it may be difficult to link the fossils to any descendant communities. Our recommendation is that aDNA researchers should follow the suggestions we specified for conducting aDNA research when there is no established connection between descendant communities and the ancestral remains. In addition to these suggestions, we recommend that such fossils may be placed in museums instead of reburying them since fossils represent extinct species. Preserving these fossils could increase researchers' knowledge of the earth's history and the diversity of life in the past [30].

Are ulterior motives bad?

Would it be justified for an aDNA researcher to use research to advance their own career? A critic may point out that this paper has not — at least to a significant degree — clarified whether promoting deeply harmonious relationships ought to be the sole motivation for aDNA research.

In response, we say that it is not necessarily impermissible for a researcher to advance their career through their work, implying that promoting harmonious relationships ought not to be the sole motivation for aDNA research. However, it should be the primary motivation. To understand how, recall that the view of moral status that is grounded in this philosophy entails the idea of owing entities moral duties for their own sake and not for the sake others. In this regard, let's suppose that an aDNA researcher has a duty to act in ways which enhance research participants' well-being. In that case, this duty will be directed primarily to the participants and only secondarily — if at all — towards benefits for the researcher. In other words, African moral philosophy, like Kantian philosophy, prohibits using people as mere means to an end.

When descendant communities request to be paid for consultation

Another question to consider is — what if descendant communities request a large amount of money as compensation for their consultation? In this case, harmony entails that descendant communities ought not to be unfair in their requests. However, it would also seem right to enjoy the rewards of such research. This is benefit-sharing. Suppose participants have contributed to the success of a research endeavour. In that case, they ought to also reap its rewards [31]. It is only fair that researchers ensure that descendant communities benefit from the aDNA research. For example, if aDNA research contributes to worldwide medical knowledge and advancements then descendant communities can receive free medical treatments that have resulted from the aDNA research.

What type of reward, and when should such rewards be distributed? Descendant communities can negotiate how they want such benefit-sharing responsibilities to be implemented [32,33]. It is vital to respect descendant communities' rights and interests in this way. Nonetheless, this paper also acknowledges that descendent communities' requests may overburden research in ways that undermine researchers' capacity to produce generalisable results. Thus, a balanced strategy that promotes communication and responsible involvement is needed to stop descendant communities from demanding too much from researchers in exchange for consultation.

Although future research would be required to articulate this strategy, a researcher could help to address the basic needs of the community whenever possible, for now. The rule of thumb here is that enhancing descendant communities' capacity to enjoy deep, communal relationships ought not to be undermined by benefit-sharing.

Conclusions

We have argued and demonstrated how the concept of harmony situated in African moral philosophy can justify the ethical permissibility of aDNA research in the absence of informed consent from descendant communities. Nonetheless, one ought to still consult with descendant communities before, during, and after conducting aDNA research. Additionally, researchers also have a duty to share benefits with the descendant communities. The sort of aDNA research that this paper considers permissible is that which is likely to enhance harmonious relationships in relevant ways. It is also worth noting here that aDNA research is advancing rapidly and in proportion with technological advances. Global research guidelines ought to also govern aDNA research, to ensure that it is undertaken in ethically permissible ways. Future studies can focus on articulating such standards. This paper has focused on a narrower question, which is: how do you advance science without disrespecting the reverence that descendant communities have for their ancestors?

Ethics committee approval: *This project does not involve research on animals or humans. It is conceptual. Hence, we did not seek any ethical approval.*

Availability of data: *No new data were created or analysed in this study. Data sharing is not applicable to this article.*

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Statement of similar work: *No other paper has been published based on this research.*

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