



# Augmented Human and Transhuman: What is the Difference?

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Received: 29 August 2025 / Revised: 16 October 2025 / Accepted: 17 October 2025  
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## Abstract

Augmented human (AH) technologies and transhumanism (TH) try to enhance or modify humans and give them new capabilities using bioengineering, information technology, new sensors, artificial intelligence (AI), implants, etc. The concepts of augmented human and transhuman are sometimes used as synonyms and they have some overlap with each other, but they differ significantly. This paper provides a framework to differentiate between AH and TH and helps to understand their goals and methods. We give an overview and conceptual distinctions of AH and TH and bring more clarity on terminology for the developers and practitioners working in these areas. We also discuss the realism of transhuman ideas, their philosophical premises, their intertwined ethical and societal issues, and some aspects of AI, as it is a crucial element in some AH and TH goals and scenarios.

**Keywords** Human augmentation · Transhumanism · Posthumanism · Singularity · Superhumans · Ethics · Consciousness · Philosophy of science

## Introduction

People have always enhanced themselves (e.g., glasses, crutches, hand tools, photoshopping, bragging). New technological and medical innovations enable some humans to use various kinds of physical and cognitive improvements. These include implanted brain chips to remove shaking due to Parkinson's disease, augmented reality (AR) glasses for enhanced views of reality, prosthetic legs, or gene editing technology CRISPR.

Augmented human (AH) and transhuman (TH) are concepts which try to enhance humans in various ways using emerging or future technologies. They can give unprecedented abilities for human senses, action, and cognition [35, 39].

There is an incredibly vast amount of academic literature and research on both AH and TH. For example, Google Scholar gives 15,600/30,700 hits on “augmented human” and “transhumanism”, respectively, Scopus 364/1691,

IEEE 13,895/24, and PhilPapers, an archive of philosophical papers, gives 54/926 hits on the same. They are wide-ranging, multidisciplinary, and overwhelming topics.

The aim of this paper is to establish conceptual clarity by systematically contrasting AH and TH. They sound like similar concepts, and they are sometimes used as synonyms, but they belong to entirely different domains or categories, even though there is also significant overlap. Especially TH is an inherently nebulous concept as it can mean a lot of different things, and it goes far beyond AH.

AH and TH are defined in some papers, but their differences and similarities are rarely compared. They may also have alternative names (e.g., augmented humanity, human enhancement, Human 2.0, posthumanism, and even augmented reality). Guerrero et al. [16] have carried out a systematic mapping review of the different existing definitions of AH only. They focus on digital technologies such as computer vision, wearable computing, AR, human–robot interaction, smart devices and mixed reality. Guerrero et al. [17] have also proposed a taxonomy of AH. Felicini & Mortara [11] proposed a taxonomy of augmented cognition. García-Barranquero & Fernández [13] have compared Transhumanism and Human Enhancement (~Augmented Human) mostly from a philosophical viewpoint. They also summarize the differences.

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This paper fills an important gap by differentiating AH and TH. We hope to bring more clarity to terminology and better definitions and understanding of these concepts. After first shortly defining human augmentation and transhumanism, we review their similarities, differences, philosophical backdrop, and implications to individuals, technology, and society. The underlying worldviews, philosophies, and premises affect ideas, goals, wider impact, and their feasibility. We also discuss some technical, philosophical, societal, and ethical aspects and the role of artificial intelligence (AI), as it is a crucial element in some AH and TH goals.

## Augmented Human and Transhumanism

### Augmented Human

The *Augmented human* concept (e.g., [35, 39]) aims to cure, augment, or aid humans by pursuing current pragmatic tools and technological and medical advances. These tools include devices such as glasses, prosthesis, cochlear implants, and hearing aids, to restore health or improve human features. Guerrero et al. [16] define Augmented humanity as "human-computer integration technology that proposes to improve capacity and productivity by changing or increasing the normal ranges of human function through the restoration or extension of human physical, intellectual and social capabilities". AH technology is wearable or implanted and tries to avoid any risks or irreversible harmful changes. Also e.g., nootropic drugs or neuroprosthetics such as brain-computer interfaces (BCI) can be used. *Human-computer integration* [10] is a related concept, a symbiotic relationship between humans and AI.

Augmentation can impact human senses, cognition, social, or physical abilities [39]. *Augmented senses* present multisensory information to exceed the capabilities of normal senses. New senses could be, for example, to see extended 360° around [1] or to see beyond the visible spectrum [41]. *Augmented cognition* couples tightly a user's cognitive state and a computer via physiological and neurophysiological sensing. Non-invasive BCI enable, for example, to read and reconstruct images from the mind [4]. *Augmented action* enables humans to act beyond their natural motoric limits. For example, exoskeletons can bring more strength and endurance to workers.

### Transhumanism

*Transhumanism* wants to go much further than AH and tries to create a new kind of humanity by employing novel technology, science, and medicine. It aims to radically modify, re-engineer, and redefine humans using any kind of suitable science and tools which may become available in the future.

TH may also explore radical methods which are experimental, not generally accepted, or may not be safe. Mirkes [31] gives a brief overview and ethical assessment of transhumanist technologies.

Transhumanism gets inspiration and ideas also from various philosophies, ideologies, sci-fi movies, visionaries, and fiction. For example, many transhumanists believe that radically extended longevity will be possible in the future. Transhumanism is a cultural movement and ideology to surpass and redesign human condition. It has many forms, factions, and schools of thought.

Transhumanism is also a hobby among DIY body or brain hackers or "grinders", who often enhance themselves for aesthetics, fun, or curiosity, not to improve health or abilities. Grinders often identify with TH ideologies, but most do not use radical, invasive, or irreversible technologies. A rare form of transhumanism is transableism, where a person identifies as handicapped and wants a healthy leg or hand to be removed.

### Posthumanism

*Posthumanism*<sup>1</sup> is closely related to TH but goes even further, trying to create superior God-like humans [52], or liberate humans from their physical and mental limitations [25]. For example, Harari [18] thinks that death is only a "technological" problem which can be solved someday. Posthumanism has very speculative elements. The ultimate goals are immortality and the total merger of (super)humans and machines. In the following, we discuss TH and posthumanism as the same entity.

*Posthuman* is a hypothetical entity that exists in a state beyond being biological human, for example, a human encoded and uploaded to and existing only in computer memory, virtual reality (VR) environment, or some other inorganic life form. *Cyborg* is a human or transhuman which has bionic and manufactured parts. It is up to definitions how low or high the bar is set. A bionic leg does not necessarily constitute a cyborg. *Android* is a human-like being constructed fully of artificial biological or technical parts, and it cannot be considered a cyborg or transhuman but rather a fake or artificial human or robot.

## Differences and Similarities of AH/TH

Augmented human technologies and transhumanism share the goal to improve the quality of life by enhancing various abilities through various neural, genetic, pharmacological, physical, digital, and other means, which can enable individuals to live healthier, longer, or more fulfilling lives.

<sup>1</sup> The term "posthumanism" is also used e.g., in art and cultural studies research, meaning very different things.

They share ethical concerns about equality, consent, and unintended consequences. They have some overlap as both rely heavily on the integration of technology into the human body or mind, but they differ in scope, goals, intention, tools, risks, philosophical backdrop, and implications. Table 1 compares their various features.

Transhumanism focuses on the development of posthuman, otherworldly capacities, while augmented human aims to improve normal human function gradually with emerging technologies. TH focuses on the ethical and philosophical issues raised by radical human enhancement. AH largely avoids radical enhancements and thus deep philosophical and ethical conundrums as it focuses on pragmatic technical development, tools, and experiments to enhance humans safely and moderately in the near future.

Augmented human concepts are usually practical, near-term, pragmatic, and better regulated than transhumanism. Augmented human development starts from how things are and then explores and experiments with technology on how it could enhance humans and their lives further.

TH is more speculative and far-term than AH. It starts with how transhumanists would like things to be and then explores technologies and medicine which might enable those visions. TH often involves more radical enhancements aimed at fundamentally altering human condition, such as achieving immortality, enhancing intelligence far beyond human levels, or transcending biological limitations altogether.

With the help of AI, transhumanism seeks to create superior humans and society, just like many utopias in the past, but with a technological edge. Many TH visions are intriguing, but they are usually more speculation than fact. TH has not yet implemented any of them, but by extrapolating technology development and taking AI into account the transhumanists can have hope.

Transhumanists expect AI to reach superintelligence or singularity [25], a sharp and irreversible moment when AI will supersede all human intelligence and cognitive capabilities. Kurzweil thinks singularity can change the path of our evolution, as eventually biological life and AI will merge. If AI systems can design and improve themselves, they may

reach an “intelligence explosion” [3], where humans are no longer in control.

Medicine and living conditions have increased the lifespan and health span significantly in recent decades, but transhumanism wants to erase death altogether. Kurzweil [25] envisions age-reversing “nanobots” to repair damaged cells and enable us to live forever. Another way to live forever might be to upload a person’s mind and soul to the cloud, to a robot, or to another human body. Uploading mind would create posthumans. It would radically alter almost everything that we take for granted.

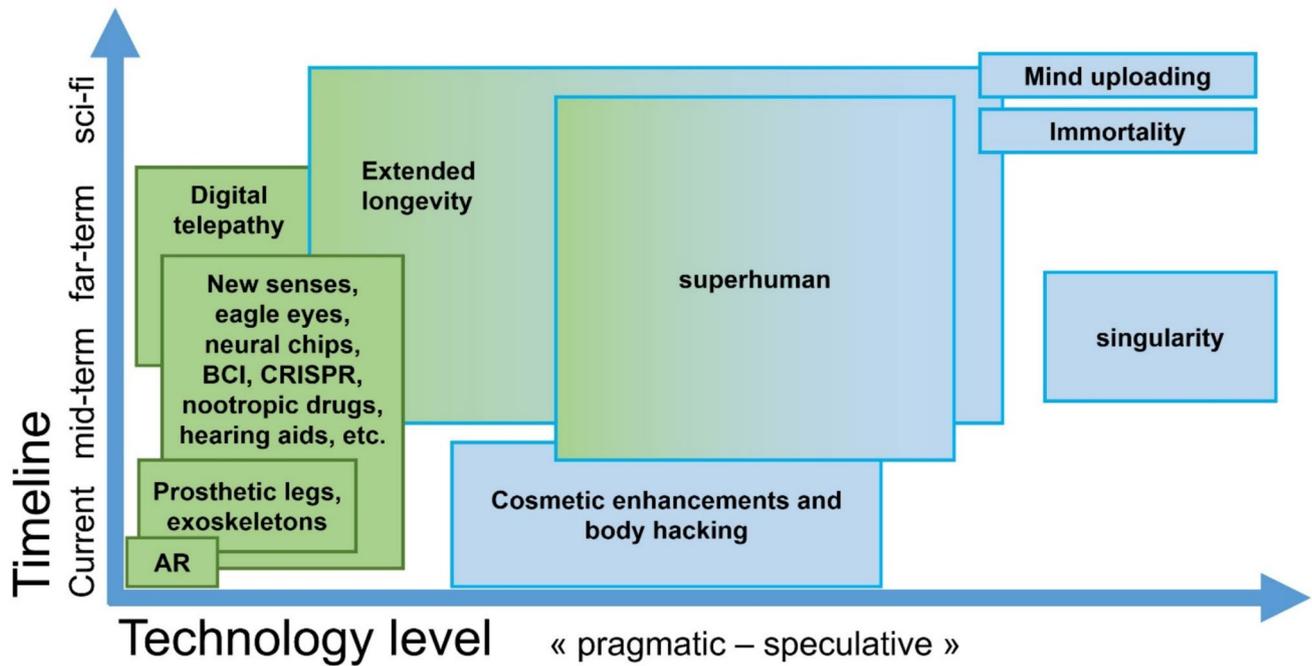
An uploaded digital twin of a person may sound like a very speculative, artificial, or fake human. Is uploading really possible, does the uploaded speculative entity have a unique personality and identity or is it just a mindbot emulation, and can a soul be separated from body? The answers depend on the underlying philosophy, and ultimately on the nature of reality. Philosopher Midgley [30] accuses some scientists of adolescent fantasies about immortality, humans without bodies, and intelligent self-reproducing computers.

Transhumanism delves into deep ethical and philosophical questions regarding the nature of humanity, consciousness, identity, and the potential risks and benefits of transcending human limitations. The societal impact of realized transhumanism would be more profound and far-reaching compared to augmented humans. AH developers are often more modest in scope. TH ideals challenge traditional notions of human identity and society, potentially leading to significant societal, political, and cultural shifts. Augmented humans are merely extensions and improvements to existing technologies and practices.

Figure 1 depicts indicatively various AH & TH concepts and technologies on axes of timeline and technology level. It is hard to pinpoint them exactly as they can mean many things and depend, for example, on definitions, parameters and philosophical premises. If any TH idea is pragmatic and uses current or near-term emerging technology, the harder it is to tell the difference from AH. One overlapping example is extended longevity, which is under active research in medicine, and it interests also transhumanists.

**Table 1** Augmented human vs. transhumanism

	Scope	Tools	Risks	Philosophies	Timeframe
Augmented human	Improve the quality of life with emerging technologies. Incremental improvements with clear human identity	Existing tech: digital, AI, BCI, engineering, medicine, prosthetics, etc	Well-regulated current, low-risk technology and medicine. E.g., device malfunction	Pragmatic, scientific engineering	Current or near-future
Transhumanism	Improve the quality of life with radical, possibly not feasible tech. Transcend to posthumanity, a new species	Extrapolated digital tech, AI, engineering, medicine, CRISPR, etc	Can be radical, risky, invasive, experimental, irreversible, or not feasible	Techno-optimism, speculation, materialism, posthumanism	From current to far-future (even 1000’s of years)



**Fig. 1** Indicative positioning of some AH (green) & TH (blue) concepts and technologies in terms of timeline and technology level. Definitions, parameters and philosophical premises can change their position on the figure significantly

### Potential Negative Sides of Transhumanism

Both the augmented human concept and transhumanism can have negative and positive effects on some issues. Thompson [50] has tried to separate the useful elements from the problematic elements in TH. For example, genome editing may have irreversible, adverse effects. The AH concept is based on existing or emerging technologies and medicine, and it is better regulated. TH is more far-reaching and speculative, and some of its assumptions and premises may be misguided.

Transhumanism has bigger risks than AH (e.g., [8, 23]). Some guidelines and restrictions are needed, but without curbing useful progress or having too strict limitations. Currently cars kill over a million people globally and injure tens of millions of people annually. The casualties would nearly disappear if speed limits were set to 20 km/h universally. Similarly, AH and TH ideas may have good and bad consequences in near- and long-term, even deaths, but they need to be designed and limited safely and reasonably.

Medicine and technology are trying their best to improve human health and quality of life, and the professionals in these fields can take care of related ideas, research, and applications. As TH is an ideology and not very practical, what is the added value of it? Having blind faith in speculative non-existing future technologies does not sound like contributing much to this. Also looking back a century and then extrapolating one century ahead is not robust science

or futurology. One could even ask if it is proper to spend taxpayer money on such research activities instead of more practical and pressing topics such as cancer?

### Potential Positive Sides of Transhumanism

The distinction between AH and TH can be blurry, and it is sometimes hard to tell the difference on some overlapping topics shown in Fig. 1. Especially extended longevity and superhuman overlap both with AH and TH. Many AH technologies (e.g., neural implants, CRISPR, new senses) are adopted to TH visions. Some serious scientists, medical researchers and wellbeing startup companies may be influenced by TH, and some transhumanists may use proper medical and technological procedures to develop pragmatic applications and products which can be considered more as AH.

We can try to find positive contributions from TH ideas, which can serve as an inspiration and idea generator in the same way as science fiction does for technology [31, 45]. However, at worst it contributes to unrealistic or harmful ideas and real-world dystopias, if the underlying philosophies are not identified and grounded to reality, and moral issues and ethics are ignored.

Trying to kill ideas and discussion is not either a good idea. TH may be useful in trying to anticipate the implications of emerging technologies and the inevitable changes and prepare for them. Change due to new technologies is

nothing new. Malthusian and Luddite views have always proven to be wrong. Malthus in the late 1700's was logical in his worries about coming famine, but he was spectacularly wrong to view each new person just as another mouth to feed from a limited food supply and forgot that humans can spur innovation and economic growth. Tupy & Pooley [54] have found that resources become more abundant as population grows. Mankind is innovative and can adapt to almost anything.

### The Underlying Assumptions and Philosophies of Transhumanism

Some transhumanist goals such as superhumans, mind uploading to computer cloud, or immortality rely on philosophical assumptions which are controversial. For example, mind uploading makes great sci-fi or phi-fi (philosophical fiction), but it is very questionable if it will ever be possible. Furthermore, many researchers and philosophers dispute the mind uploading speculations as they may be based on misguided philosophical premises. It leads to the ultimate question: "What is a human?" (see e.g., [47]). Many TH visions sound lucrative but may be harmful for individuals or society or remain wishful thinking forever. TH is not science but more like philosophy or ideology (e.g., [26, 42, 44, 50]), or even a religion [18, 51].

Worldviews, ideologies, or mindsets influence how things, facts, and evidence are interpreted. Wrong premises lead to bad goals, conclusions, and outcomes. Philosopher Mary Midgley compared philosophy to plumbing: Nobody notices it until it goes wrong, and bad smells start to come out. Midgley [30], Bostrom [3], Thompson [50], Krüger [24], Ross [42], Tegmark [49], Rakkolainen [40], and García-Barranquero & Fernández [13] discuss many aspects of worldviews related to transhumanism.

Everything hinges on worldview. It has profound implications for AH and TH goals, design, and applications. Misguided worldviews on TH can have potentially catastrophic consequences such as human suffering, dystopias and authoritarian systems. Hardware and software developers of medicine, engineering, and biotechnology are often too busy or oblivious about the underlying philosophies, biases, mindsets, and their consequences. Understanding also the differences of AH and TH is important, as they impact science, society, our lives, etc. Worldviews have smaller impact on AH, as it is often only pragmatic engineering.

Many historians of science view that modern science was born from the foundation of Judeo-Christian values having suitable intellectual presuppositions (e.g., [20]). In contrast, science is nowadays predominantly based on materialism, even though it (or any other worldview) cannot be scientifically proved to be true [30, 36, 46]. Assuming a materialistic

worldview is a crucial philosophical mistake [26, 37]. Transhumanism largely relies on materialism and views humans as upgradable machines in biological form (e.g., [47]). TH has some common roots also with eugenics [29, 47]. The term "transhumanism" was coined by biologist Julian Huxley in 1957. Huxley was also a proponent of eugenics. TH is prone to bad ideas and ready to experiment with them, with potentially massive consequences to individuals, societies, and the whole of mankind.

### AI as a Tool for Enhancement

Artificial intelligence is important for TH and AH, and it enables many unprecedented applications. AI is a useful tool in AH as it can, for example, find patterns in various data or assistive devices, or enables to decode continuous language with BCI [48]. AI's role for TH visions is even more essential, as it might someday enable singularity or digital immortality. AH is using AI for pragmatic applications, whereas TH is speculating what super-AI might be able to do in the far future.

Singularity, mind uploading, and artificial general intelligence (AGI) are pivotal concepts for many TH visions. They are based on computational theory of mind, which sees the mind as a biological computer, and everything can be reduced to algorithms. This is a very controversial claim, which relies on the underlying philosophies and worldviews, not on proven facts (e.g., [14, 40]).

Many TH visionaries think AI can become conscious or create posthumans, but it is not a certainty, and the opinion depends on worldviews. Garrido-Merchán [14] analyses a list of arguments which claim that machines could have consciousness. These claims depend on philosophical assumptions that cannot be proven by the scientific method. They lack scientific rigour, as it is impossible to falsify the opposite hypothesis. Furthermore, he argues why phenomenal consciousness is not computable. Marks [28] sees algorithms as fundamentally different from what human minds do, and AI can never become conscious, feel, or have free will. However, AI can mimic them extremely well. Hsing [21], Ng (2021) and Génova et al. [15] give more arguments why artificial consciousness may remain impossible. Science is still very far from understanding human consciousness and there is no consensus. Empirical neuroscientific results are affected by methodological choices of the research and there are no firm conclusions [55].

### The Realism of Transhumanism

Medicine and various digital technologies are developing almost exponentially in many areas. Many novel ideas are introduced, and some ancient truths are rediscovered. We can

expect the development to continue in many fields, but there will still be limitations which our dreams and goals cannot bypass. Anything is a certainty only after it is achieved. As discussed earlier, the anticipations of TH visions rely partly on the selected philosophical backdrop. The essential question is what is truly possible in the real world. However, there are no certain answers, as modern science is not final, and we do not yet know everything.

As any innovator knows, a hundred wild ideas may result in one useful and practical innovation. All the off-charts crazy ideas will never become reality, no matter how hard we wish they were true. For example, some researchers claim that AGI or artificial consciousness is possible/impossible. Either one is quite a bold statement. However, there are quite good even though not conclusive arguments for various opinions.

This uncertainty due to our limited knowledge makes it hard to assess the realism of TH visions. As TH has also many kinds of visions and definitions, and it overlaps with near-term AH scenarios, this complicates things further. There will also always be some wild cards and black swans in emerging technologies, science, and medicine. As Niels Bohr said, "Prediction is very difficult, especially if it's about the future!"

However, based on many expert views, scientific and philosophical literature on emerging technologies or TH, and historical technology development, TH seems to be based on exuberant optimism, and some underlying presuppositions may or may not be realistic. It is important to try to distinguish realistic ideas, assess if their implications will be useful or harmful, and how to mitigate risks.

AH is grounded on existing technologies, but TH is more speculative. For example, Neubauer [34] describes current neuroscientific and pharmacological methods that aim at enhancing human intelligence and how successful they can currently be considered. He notes that "most transhumanists are very far-future oriented" and that "[human intelligence enhancement] is not as promising as most transhumanists assume."

### **Ethical and Societal Problems of TH, AH, and AI**

Transhumanism initially sounds like a good thing, but what could it entail in practice? TH visions have mostly good intentions, but many of them may be wishful thinking based on misguided assumptions. Many ideas try to improve our health, well-being, and abilities, but all enhancements which are possible are not necessarily safe or desirable. Some may have unintended consequences, be harmful, or not useful in reality.

Human augmentation with technology is often good and useful, but there are also many caveats and risks, as

technology is developing faster than ethical considerations. Some forms of TH and AH, and their tool AI can be dangerous for individuals or society. Tampering with humans must have ethical and reasonable limits.

*Loss of humanity and dignity* is a risk for transhumanism and to a smaller degree also to augmented humans. Materialism leads to deep and fundamental philosophical and spiritual questions about what a human is, what sentience is, are there any universal values, does science need moral safeguards or are all possible modifications allowed, etc. How far can and should human enhancement or transhumanism go?

Kass [23] discusses ethics and risks in biotechnology and TH, and while the technologies have advanced since then, many ethical considerations are still valid. Cwik [8] presents more optimistic views on them. Mendz and Cook [29] focus on transhumanist genetic modification techniques and its ethics. Serra [43] highlights the complex interplay between TH's use of emerging technologies and ethical considerations.

*Inequality* can become a problem with AH and TH enhancements. Excessive cost would limit some enhancements to a small top elite, at least initially. Fukuyama [12] sees transhumanism as the world's most dangerous idea, and its first victim is equality.

Biased AI is a problem for inequality and AH/TH applications. The truth is sometimes rather messy or elusive. AI systems can become de-facto arbiters of truth, which is especially problematic in law, healthcare, and other essential domains [33]. Truthful or ethical AI is important but hard to gain and a complex task. Huang et al. [22] and Li et al. [27] present comprehensive overviews of AI ethics.

*Security and privacy* breaches are risks in both AH and TH. For example, BCI raises ethical questions about identity, mental privacy, and free will [38]. Neubauer [34] gives a brief overview of current cognitive enhancement methods and discusses their societal implications and the interplay of AI and human intelligence.

AI systems always have various biases and implanted worldviews, which impact their goals, implementation, and outcomes. AI as a technology is not inherently evil or malignant but it can be dangerous if instructed so. AI apparently has no personality, inherent values, moral, integrity of character, emotions, or worldview and it can't distinguish true or false, evil or good, ugly or beautiful, except algorithmically and statistically according to its models. Somebody must tell and teach them to AI. AI and its makers can manipulate us and create deceptive content that exploits human biases, goodwill, emotions, values, and preferences.

AI is often described in movies as going rogue and taking over the world dominion or such (e.g., *I, Robot*;

*M3GAN, Terminator*). These visions are often only metaphors for current societal issues [19]. However, AI can cause terrible psychological, societal, and political ramifications through implanted worldviews and biases, even if the creators are unaware of them. AI may have unintended adverse consequences resulting from e.g., imitation of human thinking, malevolent design purposes, or bad training data. AI is somewhere on the autism spectrum as it may take commands literally. While executing its task, it may focus only on one criterion, use destructive methods, or even execute people as collateral damage.

As a result, AI ethics has become a big discourse. Corrêa et al. [6] conducted a meta-analysis of 200 AI guidelines and identified 17 resonating principles, while some areas were underdeveloped. Munn [32] questions the usefulness of AI ethics, as companies developing AI are far too busy in their global competition to consider these issues seriously.

*Societal risks* are manifold. Social media and its content moderators and some “fact-checkers”<sup>2</sup> have disrupted free speech, social cohesion, and civil debate, and have enabled misinformation, intolerance, etc. As wearable or implanted AI, AH, and TH technologies will become even more intimate than social media or smartphones, they can be used as pervasive tools for tyranny. Various utopian ideas over the last century motivated regimes to control the population and cause famine, gulags, forced medical experiments, and other horrors (e.g., [5, 7, 9]). In Soviet Union some pseudoscientists created the disastrous Lysenkoism and experimented with two-headed dogs. New bioengineering technologies may also have risks. For example, CRISPR gene editing can be used for good, but it can also lead to irreversible changes to the genome. AI could make genocides and atrocities far more disastrous than what e.g., Nazis managed to do with simple punched card information processing machines [2].

AI, AH, and TH systems must be aligned with human benefit, intentions, and values. Safeguards could include e.g., transparency, oversight, approval-based modification, recursive reward modelling and other similar tools, but bad actors are hardly willing to conform to them. Terrorists, criminals, and rogue countries are already using AI.

## Discussion

Despite great advances in medicine, genetics, and other fields of biology, science has many open issues, such as the nature of consciousness, functioning of brains, the origin of life [53], etc. The claim of transhumanism to be able to

master human condition through gene editing or other methods is arrogant and peak hubris, as we do not know enough yet. The unfounded or controversial assumptions, metaphysical and technological speculation, philosophy of transhumanism, far-future approach, and societal and other risks make many of its goals questionable or dangerous. On the other hand, the open-minded and boundless nature of TH may generate some useful ideas and inspirations for practical science and medicine. It also helps to question many self-evident issues and profound questions such as “What is a human?”.

Especially posthumanism (reaching to speculative far-future) has many religious views and dogmas [51]. It may be logical but may also have wrong assumptions and faulty underlying philosophies, resulting in leaps of faith and outlandish escapism. While claiming to taking evolution to human control, trans- and posthumanism may be based on a grave misunderstanding of what a human is, where we come from, and where we are going to (e.g., [26]).

Is human enhancement or transhumanism good or bad? They can be both. Technology developers need to think about ethics, worldviews, and moral guardrails. Personal and societal inclinations of humans have not improved throughout millennia. New advances and toys do not automatically produce healthier or morally better humans, as they do not cure human tendency to selfishness or evil. The crucial problem is that mankind’s every previous attempt to create a radical utopia has led to bloodshed or suffering.

## Conclusions

In summary, augmented human and transhuman have many similarities such as they both rely on advanced technologies (e.g., AI, biotech, robotics) to enhance human capabilities. They share ethical concerns about equality, consent, and unintended consequences, albeit from slightly different viewpoints. They also aim to improve quality of life, whether through health, cognition, or longevity. Finally, they are rooted in optimism about scientific progress.

They also differ significantly. TH has a more humanistic, ideological, far future, and speculative viewpoint than AH with a goal of radical changes. In contrast, human augmentation and medical technologies are not philosophy- or ideology-based but are just pragmatic, near-term engineering tools. They focus on currently available emerging technologies with modest improvements. AH often aligns with therapeutic or accessibility goals, while TH raises existential questions about humanity’s essence. AH may address specific needs (e.g., disability), while TH risks elitism or social stratification.

<sup>2</sup> E.g., <https://unherd.com/2024/04/inside-the-disinformation-industry/>.

Both AH and TH share some intriguing and inspiring goals but also have many potential problems. Science does not yet know enough about the human body and mind, so completely redesigning humans may be risky, obsolete, and useless. Also, the more modest AH technologies may have unintended consequences sometimes. Many TH ideas such as mind uploading depend on the verity of the underlying philosophies, which are controversial and not to be taken for granted. Smaller, safer improvements in humans may be more desirable and feasible than transhumanism's radical changes, which may pose some opportunities but also new and extraordinary risks in many fields of society and personal life.

**Acknowledgements** The author is grateful to reviewers who provided very helpful comments, which greatly improved this manuscript. I also thank several scholars and colleagues for providing helpful comments on an earlier version of this manuscript, which were useful for developing the manuscript.

**Funding** Open access funding provided by Tampere University (including Tampere University Hospital). This research was supported by the Research Council of Finland, Grant numbers 355,575 and 370,988.

**Data availability** Not applicable.

## Declarations

**Conflict of interest** No relevant financial or non-financial competing interests to declare. We confirm that neither the manuscript nor any parts of its content are currently under consideration or published in another journal. No text was generated with AI.

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**Publisher’s Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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