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Transhumanist Scenarios of the (Post)Human Future. Qualitative Research from the Perspective of Social-Humanistic and Technical Experts in Croatia

Transhumanistički scenariji (poslije)ljudske budućnosti.
Kvalitativno istraživanje iz perspektive društveno-
-humanističkih i tehničkih stručnjaka u Hrvatskoj

Summary: Through qualitative research involving individual interviews with 14 experts in social-humanities and technical fields in Croatia, this study investigates transhumanist scenarios for »enhancing« both individuals and society, envisioning the emergence of a new posthuman future. It examines the concept of human enhancement through specific technological applications from physical, cognitive, and emotional perspectives, as well as the potential for life extension. The findings reveal the positive implications of technology across various sectors, particularly in healthcare and therapeutic contexts. However, they also highlight significant risks associated with transhumanization, including human alienation, the transformation of identity, dependence on technology, and the deepening of social inequality. This research offers an interdisciplinary perspective on a relevant topic, encouraging (more) engaged academic and societal discussion on the motivations and consequences of transhumanist applications for humankind and social reality.

Keywords: dehumanization; religion; death; technology; posthuman; transhumanism; enhancement.

Sažetak: Autori kvalitativnim istraživanjem, provedenim metodom individualnih intervju s 14 stručnjaka iz područja društveno-humanističkih te tehničkih znanosti u Hrvatskoj, istražuju transhumanističke scenarije poboljšanja čovjeka i društva te stvaranje nove, poslijeljudske

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budućnosti. Konkretnim primjenama određenih tehnologija istražena je ideja poboljšanja čovjeka iz fizičke, kognitivne, emocionalne perspektive uz mogućnost produljenja života. Nalazi pokazuju pozitivne dimenzije koje može donijeti primjena tehnologije na raznim područjima, osobito na zdravstvenom i terapijskom polju, ali ističu dalekosežne opasnosti transhumanizacije društva, otuđenja i preobrazbe čovjeka, tehnološke ovisnosti društva uz produblјivanje društvene nejednakosti. Doprinos je rada u interdisciplinarnom pristupu relevantnoj temi koja poziva na angažiran(ij)u akademsku i društvenu raspravu o razlozima i posljedicama primjene transhumanizma na ljudski rod i društvenu stvarnost.

Ključne riječi: dehumanizacija; religija; smrt; tehnologija; poslijeljudsko; transhumanizam; poboljšanje.

With the development of modern technology and science, the pursuit of human enhancement has gained significant momentum in the context of transhumanism understood as a movement, philosophy and practice, which approaches human as flawed beings that needs to be improved through scientific and technical interventions. Consequently, it advocates »the end of all the painful contents that gave man a sense of finality and limitation; the promise of victory over aging and over death seen as man's greatest enemy; the possibility of governing and treating one's own body according to one's desires and urges; the possibility of extension of various faculties – mental and physiological in every sense – as a moral right of every man« (Singbo, »Teološko-bioetičko vrjednovanje« 154-155). The conflicting perspective of bioconservatism sees these efforts as a dehumanization of humankind and a dystopia of society, while transhumanists point out that the possible risks are not a justification for limiting or preventing the anticipated technological improvements of man and society in the future (Brstilo Lovrić and Zujčić 450-452).

This paper argues that transhumanism, both as a movement and a platform, does not engage in a critical examination of the concept and realization of the hyperhuman and the postsociety across broader sociological, anthropological, theological, and bioethical dimensions; instead, it tends to promote a reductive, technical vision of the human being and society, which opens the door to potential ideological applications.

This is exemplified by various enhancement technologies that go beyond restoring health and normal functioning to augmenting human capabilities even in individuals without medical needs. Concrete examples include bionic legs for faster movement, Brain-Computer Interface technology for seamless interaction between brain and computer, the Thync device for regulating emotions and mental states, and cryonics for preserving the human body with the aim of future revival.

A rare Croatian empirical study on this topic found that 81% of surveyed young people supported the implantation of an artificial body part following an accident,

indicating a broad acceptance of transhumanist elements in the context of normalization. Additionally, some respondents expressed interest in consuming products to enhance mood, concentration, and memory, as well as in implanting physical enhancements beyond human norms, such as infrared vision. Meanwhile, nearly half of the participants agreed with transhumanist claims about the incompleteness of human evolution and the parallels between the human brain and computers, echoing the findings of some earlier sociological research (Brstilo and Nikodem 73).

To update research on this topic from the perspective of Croatian citizens and to foster a more profound multidisciplinary scientific and societal debate, primarily grounded in sociological, bioethical, and theological perspectives, on the risks of transhumanism for individuals and society, original empirical research was conducted in 2023 and 2024 using qualitative methodology. The study involved experts from diverse educational backgrounds, whose insights into the positive and negative consequences of selected transhumanist technologies are analyzed and presented in detail in this paper.

1. Transhumanist enhancement technologies

From a transhumanist perspective, any enhancement of humanity through technology and science is a proactive and praiseworthy act through which the boundaries between natural, biological human beings and artificial beings are blurred (Greguric and Vertovšek 32). It was in this perspective that the biomedical connotation of enhancement »evolved« into a morally justified and positive meaning (Selak 64).

In this paper, we start from Sabin and Daniel's definition of *enhancement* as »any change in the biology or psychology of a person which increases species-typical normal functioning above some statistically defined level« (Kahane et al. 5). This definition provides us with a broad understanding of the concept of transhumanist enhancement in accordance with the objective and methodology of the undertaken research.

In this paper, we analyze four types or levels of human *enhancement*: physical, cognitive, emotional, and the extension of life expectancy as a means of overcoming human mortality. These categories serve as a lens through which different epistemologies of the (post)human body are explored, both before and after transhumanist intervention. According to Singbo, physical and cognitive enhancements mark the initial phase of human hybridization with machines, where the physical body remains recognizable. In the second phase, the human body becomes technologically upgradable and replaceable, while in the third evolutionary stage, the human exists as an individual entity but functions without a physical form (Singbo 98-99). The following section presents each of these transhumanist *enhancements*, illustrating their potential benefits and risks for individuals and society through selected technological examples.

1.1. Physical enhancement

Physical enhancement relies predominantly on the use of biomedical devices to overcome physical limitations. For instance, chips can be embedded under the surface of the skin with various functions such as »unlocking doors, starting cars, storing ID, and more« (Greguric 132). According to research by Brstilo Lovrić and Zujčić, a quarter of young people in Croatia are ready to implant a chip into the body for the purpose of preserving their own health and monitoring body functions (455). In addition to chips, an example of physical enhancement is wide-spectrum devices such as *Eyeborg project*, which can compensate for human deficiencies caused by illness or accident, as well as improve human abilities. One of its »consumers« is Neil Harbisson, officially the world's first cyborg, who saw only black and white tones due to an eye disorder. With *Eyeborg I* implementation, he gained the ability to convert 360 color tones into sounds and recognize 36 different types of tones, with the ability to see different parts of the electromagnetic spectrum and send information from his cell phone via Wi-Fi to a chip located in his skull (Greguric 127–128). An example of physical enhancement is the use of bionic legs as advanced technological prosthesis that have the ability to replace and improve the functions of human legs in such a way that they enable mobility – movement control and natural gait execution based on the principle of natural movement, but also greater endurance – strength and stability, which surpasses natural human abilities (Helgesen).

The positive aspect of physical *enhancement* from the perspective of its proponents is the acquisition of a new sense of *self* in the integration of physical and technological, as well as the ability to monitor human health in real time and develop new abilities that man is (was) not able to experience naturally. With Max Weiser's predictions using smart devices and embedded chips, human beings will be able to interact with inanimate things, and human reality will be placed in virtual reality, facilitating everyday life and access to information (Greguric 132–133, 193).

From a critical perspective, this technology can be related to the danger of controlling human thoughts, ideas, and decisions, as well as to the risk of man becoming an automaton, programmed to accomplish a goal, and then becoming an artificially created being. There are also concerns about increasing inequalities between *enhanced* people and *non-enhanced* people in different spheres of society such as sports, education, work and beyond (Greguric and Vertovšek 40–41).

1.2. Cognitive enhancement

The process of cognitive *enhancement* is defined »as the amplification or extension of core capacities of the mind through improvement or augmentation of internal or external information processing systems« (Bostrom and Sandberg 1). In a modern context, cognitive enhancement is associated with »smart drugs, gene therapy, or neural implants« (Selak 77).

On this principle, devices are already used daily to monitor steps, measure body temperature, heart rate, etc. Nevertheless, cognitive *enhancements* encourage even more complex actions, for example Neuralink – a brain-computer interface device that allows brain-computer communication; the Mindflex device, the so-called wearable brain, which aims to »improve focus, detect stress or play video games directly with thoughts« (Greguric 140). Neuralink, the eponymous device and company of one of the wealthiest people in the world Elon Musk, promises revolutionary brain-computer communication with the potential to expand people's cognitive abilities, restore neurological damage, because of which it is possible to restore the functions of sensation, movement, speech, etc.

The cognitive *enhancement* option is obviously attractive to young people in Croatia. The research by Brstilo Lovrić and Zujic showed that for the purpose of achieving better concentration and memory, an approximate third of them would use products for their improvement, while close to half of them supported the transhumanist thesis on the similarity between the human brain and computer (454–455).

Proponents of these technologies point out that higher cognitive abilities allow for fuller access to information and experiences about the environment and oneself, and in this way the individual bases can help a person lead a more authentic life by enabling her to base her choices on more deeply considered beliefs about her unique circumstances, her ideals, and the options available to her (Sandberg 82-84).

In a critical perspective, these technologies address security, privacy and data protection, fear of changing human behavior and control of the human mind and then changes in the characteristics that are the basis of the authentic identity of a person, as well as issue of social regulations through legal perspective (Sandberg 82). At the same time, with this technology, the growth of social inequalities can be predicted in the context of socio-economic (im)possibilities of access to them, as well as the susceptibility to different user manipulations, bearing in mind unclear criteria of use on the basis of health justified application (assistance to disabled persons, persons suffering from neuropsychical diseases, etc.), and application for the purpose of improvement as such (in people without such health indications).

1.3. Emotional enhancement

One of the most widely used mood enhancers is Prozac, an antidepressant often referred to as the happiness pill, which is also taken by healthy individuals seeking to feel better than simply well (Fukuyama 46). Beyond pharmaceuticals, transhumanist advancements aim to enhance mood through technology, as in the case of the Thync device, which allows users to regulate states such as wakefulness, focus, relaxation, and calmness, with adjustable duration and intensity via a mobile app, while transcranial magnetic stimulation and deep brain stimulation have shown promise not only in treating neuropsychiatric disorders but also in boosting self-confidence (Berghmans et al. 157-159). These devices operate through neurostimu-

lation, typically by being placed on the user's head, where they influence mood and mental states. For instance, the Thync device, as a wearable technology, delivers electrical stimulation to specific areas of the brain and peripheral nervous system to induce a desired positive effect. In this context, it is particularly noteworthy that research by Brstilo Lovrić and Zujic found that one-fifth of respondents expressed interest in mood-enhancing products (Brstilo Lovrić and Zujic 455).

In the field of mood *enhancement*, there is limited knowledge of deficiencies and benefits as in other types of *enhancements*. In accordance with the previous example of cognitive *enhancement*, this technology also addresses enabling the regulation of emotions and mood, relieving stressful situations with an emphasis on individual regulation. But the problem of the mood *enhancement* of a healthy individual enters the »grey« area of personality and potentially changes the whole identity of the person and raises the issue of inequality of access to them.

1.4. Life extension

Alongside physical, cognitive, and emotional enhancement, transhumanism also advocates for extending the human lifespan, potentially achieving immortality – its ultimate vision for the future. In pursuit of this goal, the Biofile project was launched, allowing for the free storage of »genetic material and the creation of a base for generating a new body in the future« (Greguric 142). One method used to preserve the body is cryonics: After death, the human body is lowered to a temperature between 10°C and 0°C, after which the blood is washed out, and the body water is replaced with a cryoprotectant. »The subject is cooled to a temperature below 120°C and held in cryostasis. When and if future medicine has the capability, the subject will be rewarmed, the cryoprotectant will be removed, tissues will be repaired, diseases will be cured, and the subject will be rejuvenated« (Best 494).

Transhumanists believe that eliminating death will improve life for the individual and their environment, allowing for a more creative and active contribution to society. Transhumanist Aubrey de Grey predicted that by 2030, it will be possible to extend life (Singbo 51), leading, in the words of nanomedicine expert Robert Freitas, to the end of biological aging and the beginning of a new biological age, as outlined in several stages by Ray Kurzweil. The first stage is based on the dominance of nanorobots, whose primary function will be reaction and problem solving in the human body. Organs will not be needed because their function will be taken over by nanorobots endowed with organic properties. The result is the disappearance of the body: »ultimately, machines will become equivalent to and surpass our biological capabilities« (Singbo 234-235). The period without organs and bodies is called *Singularity*. Apart from Singularity, through the action of artificial intelligence, Kurzweil points out that we will transfer consciousness into machines which will lead to immortality and expects that by the middle of the 21st century, man will agree to »metensomatosis« i.e. the transfer of the human body to a computer (Singbo 76).

Singbo argues that this technology treats man not as a whole being, but as a manipulable genetic material, making old age and death biological errors («Posmrtno stanje» 265–266). Driven by the desire to extend life and conquer death, man becomes a self-creator, with technology serving as a technomessianist tool (Singbo 114). In addition to the religious aspect, life extension brings several social changes, of which Fukuyama discusses the burden of the pension system, the need for life-long education, the increase of nursing homes, the expected changes in the political and educational system, and numerous other changes for the global society (Fukuyama 57–71). As with other examples, this highlights the rise of social inequalities, potential loss of meaning in life, and an increase in suicides (Singbo 284). A survey of the student population revealed that most disagreed with the claim that genetic engineering could fulfill promises of beatitude and immortality that religion cannot, and disagreed with the idea that eliminating aging is a primary goal of techno-scientific development, although a portion of respondents remained undecided (Nikodem 177). Similarly, a survey of a representative sample of Croatia's adult population showed that most disagreed, with around a fifth of respondents undecided (Brstilo and Nikodem 73). Furthermore, more than half agreed that genetic engineering allows humans to play God, reflecting a critical stance toward its application and promises (Nikodem 177).

The following section presents the views of Croatian experts from both the social-humanistic and technical fields on *enhancement* technologies, highlighting the benefits and risks they identify, starting with a description of the conducted research.

2. Outline of research

For the purpose of research of transhumanist technologies from the perspective of Croatian experts of different educational profiles and work experiences, research was conducted using the method of semi-structured individual interviews. It allows to expand the issue in the form of a free conversation and is suitable for the »implementation of the so-called in-depth research, which examines the background of opinions and attitudes, motives, behaviors« (Lamza Posavec 71), thus corresponding to the topic and the stated research goal.

Namely, the overall goal was to investigate the opinions of experts from the social-humanistic and technical fields on the individual and social reflections of transhumanist technologies. Experts with diverse educational background were selected to approach the topic multidimensionally in connection with theory and practice with the assumption that participants of social-humanistic education are more theoretical, and participants of technical education are more practically familiar with the topic of transhumanism, which is a predisposition for its in-depth research. According to the question protocol used, participants were invited to

openly and honestly comment on the positive (welcome) and negative (problematic) dimensions of multiple examples of technologies and part of the findings is presented in this paper.

A non-probabilistic, purposive sampling method was used, selecting participants based on predefined criteria, including voluntary participation, formal education, and professional experience in the social-humanistic or technical fields. Specifically, participants had completed higher education at the professional, specialist, or university level. In the technical field, eligibility also included secondary vocational training in technical discipline or extensive experience in the sector. Participants from the social-humanistic field held degrees in sociology, philosophy, psychology, communication sciences, economics, law, or foreign languages.

Participants from the technical field held higher education degrees in computer science, electrical engineering, and mechanical engineering. One participant had a secondary professional degree in computer science, while another was a technical faculty student with several years of work experience in the IT sector. To familiarize participants with the topic of transhumanism, visual representations of selected examples of four types of technologies were presented, accompanied by brief descriptions of their functionality and performance.

A total of 14 individual interviews were conducted, seven from each field, with six taking place between August 2023 and the first half of 2024. The initial set of interviews was conducted for a master's thesis, while the later ones aimed to expand the analytical base for further scientific analysis using the same methodology. Most interviews were held via the online platforms Google Meet and Microsoft Teams, while four were conducted in person. The average interview duration was 25 minutes. After the interview, participants were asked to fill out a short survey about their sociological profiles shown in the table.

Table 1. Characteristics of research participants (N=14)

Profile of participants	Religious	N	Gender	Age	Pseudonyms
Social-humanistic experts	Yes	2	Female	23-28	Ivana, Ana
		1	Male	25	Luka
	No	3	Female	23-41	Maja, Marija, Marta
		1	Male	28	Ivan
Technical experts	Yes	1	Female	50	Petra
		1	Male	25	Josip
	No	1	Female	28	Lea
		4	Male	24-42	Božo, Mihael, Šimun, Jakov

The research was conducted in accordance with ethical research principles. The neutrality and objectivity of the researcher-participant relationship were respected, considering that the researcher's personal views did not »affect the choice and defi-

nition of the research problem, the choice of the subjects or the interpretation of the results and their presentation to the public« (Lamza Posavec 207). All participants were thoroughly instructed to read and sign an informed consent form, which included essential details about the topic, purpose of the research, and the data collection method using a mobile audio recorder for transcription and analysis. Anonymity was guaranteed using randomly assigned code names, and participants were informed of their right to withdraw at any time during the study. Access to research data was restricted to the authors of the paper, and the recorded interviews were stored on a password-protected external device, to be irreversibly deleted upon completion of the research.

Given the limited research on transhumanism within Croatian society, this paper offers an empirical contribution by addressing a globally relevant topic from an interdisciplinary scientific perspective. It integrates diverse participant profiles and various types of technologies, providing a practical framework for systematizing potential scenarios for the application of transhumanist ideas to humanity and society. This, in turn, facilitates a deeper critical analysis by both the scientific community and the public in Croatia. Further reflections from the participants are presented in the next chapter.

3. Analysis

3.1. Physical upgrade: an example of bionic leg technology

All participants in the technical field emphasized the positive aspects of physical enhancement in the context of bionic legs. They praised technology's ability to restore walking as a normal physical function, aligning with health, therapeutic, and functional normalization. In this regard, Šimun highlights:

»Since I'm in that area, all these physical assistances fully support this technology (...) It is ok for me to perform and function normally in society and be treated like a normal person« (Šimun).

Four participants criticized the financial aspect of this technology, expressing concerns that it will not be equally accessible (or free of charge) to all members of society. As Šimun stated, it will become »a luxury if one can afford it.« Some participants, such as Petra, raised concerns about the individual aspect of not embracing this technology: »the way in which man accepts these new technologies and whether he really wants them, it might be individual in man himself,« while Jakov focused on the social aspect of rejecting this technology out of fear: »I think people would react quite negatively (...) I think people are quite afraid or can be intimidated in some way« (Jakov).

In the controversial context of sports and transhumanism, Josip's concern about the fairness of competition is particularly intriguing, as he contrasts athletes with natural legs against those who would implant bionic legs:

»As for the negative things about how in sports and athletics there is a lot of discussion about how much there was then a fair, positive case. There's the case of Blade Runner (...) I'm not familiar with how it was mechanically working, but what I think is that it does carry an advantage anyway« (Josip).

All participants from the social-humanistic field also recognized the positive aspects of this technology in terms of normalization, as exemplified by Marija's testimony:

»Well positively of course, a person who has no legs can walk (...) They have the possibility that is somehow maybe hope in the sense that even if an accident happens, I know I have a chance. It's not like I'm going to end up in a wheelchair« (Marija).

Two participants also recognized the benefits of bionic legs in sports, a perspective not shared by experts in the technical field, who criticized their use in this context:

»But it is certainly a positive, positive thing. It enables people who without this technology would not be able to return, I would say, normal. As far as I know there are generally different types of bionic legs. I think there are qualified people who are in sports, athletes for running, for cycling and so on. I think that's really the positive side of it« (Ivan).

»Well, the positive fact is that the man is not tied to a wheelchair and has the ability to move to be the man he was before (...) well then there is a mass of people with bionic legs who are skilled and runners« (Maja).

Furthermore, the majority of the six participants in the social-humanistic field cite negative aspects also in the economic context and the resulting social inequalities in terms of cost, rarity and unattainability for most people. In addition to the economic dimension, Luka related the problem of transhumanization with the analyzed technology, pointing out that it »can be at some worldview level, and this implies some transhumanist moment«, while the participant Ivana presented the problem of robotization of man:

»What is negative and what creates confusion for me on some other level, precisely from the position of communication, is the color and background itself (...) There are always some grays and whites in the background and always everything is sterile as devoid of life. And to me, it kind of directs me to those reflections on that form of progress. Why is it so sterile and why is it deprived of life, when in fact it should breathe life into someone?« (Ivana)

Alongside the previously mentioned negative aspects, two participants from the field of psychology raised concerns about the unpredictability of technology, specifically regarding the inability to control oneself, issues with self-acceptance, and the problem of privacy:

»Technology is unpredictable. I don't know, the legs start running on their own or something I don't know how it works. But in the sense of unforeseeable and can only put a person in danger« (Marija).

»Well, from a psychological perspective, there are a whole range of questions that then violate his privacy (...) May be somehow its own non-acceptance« (Marta).

Participants from the social-humanistic field align with technical experts in recognizing the positive aspects of the bionic leg, with all seven highlighting its benefits for health and normalization. However, social-humanistic experts also emphasized its advantages in sports, a perspective not shared by the technical experts, who criticized the technology. When it comes to physical enhancement technologies, particularly bionic legs, participants from both fields largely agree on the positive aspects of normalization and health improvement. The negative aspects, however, are predominantly focused on social inequality, particularly the lack of access to this technology. Participants from the socio-humanities offered more detailed criticisms, pointing out issues such as robotization, transhumanization, loss of privacy, and technological unpredictability. In contrast, three participants from the technical field did not raise any negative aspects of this technology.

3.2. Cognitive upgrade: an example of brain-computer technology project

Four experts in the technical field highlighted the positive aspects of using this technology, such as aiding individuals, investing in progress, and advancing scientific purposes. However, their comments were far from unanimous. Jakov and Josip, for instance, point out the following:

»I think the great progress of all mankind is to be able to cooperate with the computer, but there is always this moral segment that I always question« (Jakov).

»Again, these cases prevent epilepsy, ok, these are some cases, but this technology involves a lot of things« (Josip).

In contrast, all participants in the technical field noted the negative aspects of the technology under study, including the alienation of humanity, the creation of a cyberman, the loss of human essence, security risks, and the potential for abuse and manipulation. Their perspectives on this are as follows:

»It's negative that the computer controls, guides the part that is embedded in it. It is a negative addition to humanity, to humankind, and I think that in this way (...) It's totally negative to me« (Petra).

»I say a man is actually transforming into a cyber man. I think there's an extremely high fear of manipulation today, tomorrow as far as people are concerned... Tomorrow we can get cyber soldiers. People who are connected to computers and cell phones, who are not really people« (Jakov).

»I don't think he's human anymore. I don't know how this implementation would work, but apparently the possibilities that open just as close a bunch of things from elementary, from human. From a normal circuit of memory, introspection, we are not created for this level of receiving information. I mean, it's also a spiritual question. The human being was not made for such coexistence with technology« (Josip).

Most social humanists, four out of seven, perceive the positive aspects of this technology through the facilitation of communication to people and global society:

»I think people can do some basic things that they couldn't do without. That is, or they need a little more effort about it (...) It would help for certain diseases« (Ivan).

»I guess that would make it easier for people to access information that might be interesting to make it more effective. At least in some daily activities. It would narrow the world and open a greater level of communication« (Luka).

All participants from the social-humanistic field acknowledged the shortcomings of this technology, emphasizing the risks associated with transhumanism, control, the alienation of humanity, social inequalities, and the modification of humans through the creation of hybrids. Some participants further explored the dangers of this technology from a religious perspective, highlighting concerns about freedom and the erosion of humanity due to the neglect of the divine aspect in human creation.

»This is where we have entered true transhumanism. It's a man-made technology. Man always creates technology to make a profit. There is a chance that this would give the comparative world not only insight but also the level of control of the human mind and the thinking of the human which could result in very, very pathological behavioral models that could be used to accumulate profit« (Luka).

»Again, reducing a human to just one totality, to a being, if we can even call it that. Somehow, I don't know. A being without a thinking component, without a spiritual and soulful aspect. How does it even cross someone's mind that it would be a great idea to take something intellectual and spiritual, turn it into something computerized, and control it? Come on. A human, no, but a person. And then I find it unbelievable that this should be seen as something positive. It scares me because it raises the question: where does freedom end, and where does it begin. A human will no longer be able to exist as a free being if they choose to have a computer for the brain. Anyone could come along, control them, and program their thoughts. That's the issue, where is freedom, where is thought, where is the uniqueness of creation? It completely disregards the hand of God. Essentially, we play the role of the Creator, but we are not the Creator. I see nothing positive in this« (Ivana).

Giving too much power to technology according to Marija can increase mental disruptions and »diminish some of the abilities of humans« by giving too much

power to technology »which is so available to us that we no longer need to do anything«, while according to Maja it is a matter of losing human personality by creating a hybrid of human and technology. »That means that no human being is working anymore (...) [Technology] acts as a part of his body and perhaps even more deeply a part of his personality« (Maja).

Experts from both areas highlighted several problems related to this technology such as the loss of humanity and human autonomy, and both groups of participants had less elaborate positive elements compared to the first question. Technical experts emphasize the problem of the management of the individual, while on this issue social humanistic experts give more detailed criticisms in the form of transhumanist and posthuman elements. A part of the participants from both areas associates with this technology the violation of the spiritual dimension of man and through a religious perspective they notice the dehumanizing consequences for man and society.

3.3. Emotional enhancement: an example of a Thync device

Thync enables mood swings based on personal preferences and is an example of emotional enhancement technology commented on by participants. The technicians did not notice any positive characteristics of the analyzed technology, while they repeatedly problematized the possible manipulation of emotions:

»I don't see anything positive in this. You are directly interfering with the natural human state of emotions. You reduce emotions to mere biological impulses, something you can change, but they should be viewed more broadly and holistically. And you change them based on your own desires, if you feel a little happiness, then you'd want a little sadness. In any case, I don't see this as beneficial for long-term mental health. I think we would really slip here« (Josip).

»They will send me some impulses, so they will manage to regulate the mood to be that focus and something like that. You give credibility to the app to control your brain, your electromagnetic impulses being your primary rulers, that's what I find insane. This is so dystopian technology that I'm not talking about the fact that data must certainly be sent to some central server that will process it, the data story of your brain at that level is one of bad things (...) I only see bad things« (Šimun).

In addition, technical experts emphasize the danger of possible dependence on this technology, which they compare with drugs, as well as personality impairment:

»I don't have the best opinion or a good opinion about this kind of technology. I can compare it to drugs because, as we know, drugs cause sensations, feelings, false sensations, i.e. they provide a bunch of false sensations after which the effect of the drug stops, or I do not know certain technologies that simulate the sensation. People could develop new types of addiction that would not be specifically drug addictive but would be technologically addictive. In other words, without that people would not want to live« (Jakov).

»I only see negative things because with this technology we literally bypass our own personality. Let us imagine that someone accidentally changes the settings of his mood based on his desires and this drastically negatively affects him« (Mihael).

Unlike a group of technicians, experts in the social-humanistic field spot some positive aspects of the Thync device. Thus, three of them mention the possible benefits of the device to help people improve their emotional state, i.e. reduce and treat mental illness and negative emotions.

»Maybe someone is having a really tough day (...) they want to feel good after a hard day at work but don't know how else to achieve it. They don't have the energy to do it. Maybe this would be a good way to quickly connect« (Ivan).

»I do not have any positive unless it would be used in the form of treatment of severe mental disease and in the short term« (Marta).

Like technicians, participants from the social-humanistic field address the negative aspects of this technology, including the dangers of robotization of man, alienation, creation of a selfish being, transhumanization of society, technological dependence:

»It would just be suppression. We are not the devices that are now stressed and now you press the button that turns off stress and we are no longer stressed and turn on joy or some other emotion. That's how devices, and maybe some robots work, but not people (...) I think it's unnecessary to make ourselves some robots without feelings, without emotions« (Ana).

»I condemn this. This is really bad, and I don't agree with that. Because it's about willingness. I desire it, so I want it. Totally irresponsible to life, society, the environment, to the responsibilities you have. And to the roles you have as a mother, teacher, professor, sister or whatever you are in the world. It is impossible and unhealthy to regulate your mood according to your desires. Again, it turns man into an inhuman being, but this is so selfish and outlines the man to only run away from the pain, and it's stupid and unnatural« (Ivana).

»Such trivialization would be a fatal and moment of the colonization of the human being by transhumanism. Technology is already shaping our lives in unpredictable and enormous ways. This would be a radical step in that direction« (Luka).

Psychologist Marta highlighted the problem of possible addiction and the emotion functionality:

»Every emotion serves something when it is evolutionarily sustained. Grief serves; it has its evolutionary purpose. I mean, the shifting of emotions actually disables our brains to learn from experience. That's the first. And secondly, what's the difference if someone changes their moods that way and snorts cocaine? Same, same thing« (Marta).

Psychologist Maja also problematized the loss of emotions as a possible social problem and criticized the potential disappearance of authenticity of human social development.

»This kills all authenticity, this is, I think, it would really be used by people who want a quick fix, here and now, and with that, would be building a society where people actually stop developing and instead rely on technical solutions that instantly solve their problems. But realistically, you could put this on a soldier's head, implant a chip in some future version, and then send them to war. Then you could just let them be amped up, to be murderous and to kill the whole village« (Maja).

Unlike social-humanistic experts, technical field experts focused solely on the negative aspects of this technology, highlighting concerns about emotion manipulation, personality changes, and technological dependency. Meanwhile, participants with a social-humanistic background raised additional criticisms, including human alienation, the objectification of emotions, social consequences, the spread of transhumanism, and increasing robotization. However, they also acknowledged its potential benefits, particularly in regulating negative mental states and treating mental illnesses.

3.4. Life extension: an example of cryonics

The extension of life expectancy or the creation of an immortal man in the example of cryonics for a minority of three participants in the technical field has positive characteristics in the form of promoting hope for a better life in the future, of developing science and health assistance. As a result, they pointed out:

»I think it's a good thing if there is a disease or a medical issue. Some health problems that are incurable today, a person can be thawed or cured. Well, I think it's positive only because no one wants to die. In general, I look at this as a positive thing. Why should I be old and sick when I can be healthy and young?« (Mihael).

»I think it's a kind of hope to man as it's a kind of faith, a religion or something like that. If you believe and have the money to do something like that in potential research or potential hope it will be possible. I'm ok with that because it's an investment in the future, an investment in scientific purposes« (Lea).

Participants in a larger number problematize this technology, with four out of seven participants in the technical field seeing the possible intervention in the natural course of life and the resulting social inequality as key problems.

»Then again you intervene in the natural course of life. I don't know what you're trying to accomplish with that. Waiting for a better time when it will be able to have some surgery. You can draw some marginal examples, certainly something that would seem to be positive, but in fact you intervene in the natural course of life. You are intervening with technology, as with euthanasia or with apparatus« (Josip).

»I think only some very rich people can afford such things. On the other hand, I see no great meaning other than some potential hope that tomorrow there may be the discovery of technology that these people can wake up or recreate themselves« (Jakov).

In addition to social inequality, Šimun problematizes the fear of death as a human unknown, interpreting the analyzed cryonics technology with the perverse luxury of the rich classes:

»I understand that a lot of rich people are certainly afraid of death and accept that after life comes death or maybe they are not religiously oriented or maybe they are religiously oriented. There's something in their head that creates big fear. You literally arbitrarily give consent to be made for you, as they practically kill you, but this is a perverse luxury for me« (Šimun).

The production of this technology in Mihael's view leads to economic exploitation as well as human dignity:

»And the negative thing I see is that today the companies that do these things have no way of defrosting those people, and those people are dead. In fact, they take away people's money, people who are desperate for things« (Mihael).

In addition to the positive and negative aspects, the testimony of the participant Božo, who attributes the aforementioned technology to supra-technical expertise and the resulting confusion about the positive and negative determination, which prevailed over the latter:

»It's more of a biological issue than a technological one. Probably humanistic yes, but not quite technological, IT-based as the previous case. So maybe I'm not aware of the negative consequences it might have. I really don't see very positive things about it. But I leave it to others to have theirs. Probably because of too little knowledge, I would not give any more complex answers« (Božo).

Four social-humanistic participants see positive elements of the technology studied through scientific and biomedical purposes, as well as opportunities to get to know the wider family through »revived« family members:

»Positive, maybe it could be if it's a way to preserve the human body in some pretty good condition, maybe it could be used for medical purposes. A person who has died from a very rare disease, and who can be studied through the body if the body is kept. Perhaps it could be preserved so that it could be later studied, done experiments« (Ivan).

»I mean, it's a good thing for science in the future. If that really works out in 150 years, we can open to some person who is now 20, 25 years old. I think purely from that scientific perspective they have a preserved body from 100, 150, 1000 years ago« (Marija).

In addition to the positive aspects, six out of seven social humanists highlight the negative aspects of the technology studied such as loss of energy print, issues of responsibility, overcrowding, social inequality, the spread of transhumanism, fear of death, and human selfishness.

Maja, although declared as an agnostic, responds that she believes in energy and that the use of this technology can lead to the loss of it. Consequently, she concludes:

»I'm not up for it. And I diagnosed myself, declared myself agnostic, but what I believe in is energy and they may have preserved the body, but that energy print is no longer there« (Maja).

Ivana, through her religious, Catholic perspective, questions this technology by addressing the issue of human fear of death and the creation of social inequality through the lavish aspiration of the rich to extend life:

»I think from my Catholic perspective, I want to be resurrected and should be resurrected into body, so I find it a little silly. It's not stupid for me, but I'm not in the body. I'd like the body to lie down with me. Technology will never come to that. I'm sorry because people are so insecure and empty that they're afraid to die and spend their whole life in fear of death. Then out of spite for having money they prepare their death to rise again. It doesn't make sense« (Ivana).

Through the question of the meaning of life in connection with this technology Luka notices the pathological expansion of the transhumanist focus on the quantity, not the quality of human life:

»I think it's a pathology. That it's a transhuman manifestation that people want to live more than they should ever biologically because they're focused on quantity rather than quality of life. In this sense, death gives life meaning. Every resort to this only expresses the insecurity of a man who cannot find meaning in his life« (Luka).

Participants Ana and Marta question this technology in the domain of social inequality with the argument of elitism:

»Every part of our body has a purpose, it serves something. One would live, it would not be right if it were possible, because it would not be possible for the broad masses. It would again be some Rockefellers or Rothschilds or the English royal family who would have that privilege. There's no way this would be possible. They would live for 300 years and rule the world« (Ana).

Participants from both groups highlight the primary benefits of cryonics in advancing science and medicine for the betterment of humanity, though not as a means of bodily resurrection. However, they associate numerous drawbacks with the potential for social inequality, stemming from its presumed inaccessibility to all social strata and the resulting elitism. Meanwhile, religious participants and agnostics question whether it undermines the very meaning of life.

Conclusion

The qualitative research conducted with social-humanistic and technical experts in Croatia showed that they are more critical of transhumanist ideas of enhancement than supportive. The participants highlighted a range of issues, such as the potential for elitism and the deepening of social inequalities, the (un)justifiability of technological interventions into the human body without medical indications, pri-

vacy threats, and the loss of human authenticity. In this context, they oppose the rational use of technology for health purposes within the framework of normalization, as opposed to the transhumanist goal of creating an immortal human, enhancing physical strength, connecting human brains with computers, and modifying human emotions. Both groups of respondents emphasized religiosity as a key perspective on the analyzed technologies, through which they questioned the issue of *playing God*, spiritual alienation, the degradation of human dignity, and, in general, the creation of an inhuman society where people would be reduced to robots and automatons devoid of personality.

An indicative finding is that some technical experts systematically refrained from commenting on certain technologies, explaining that they lacked knowledge beyond their technical expertise. This was not the case with social-humanistic experts, who generally provided more detailed reviews, emphasizing the problematic and negative aspects of the analyzed technologies. Based on this finding, it can be further argued that education serves as an active factor contrasting the »purely« technical expertise with the »broader« social-humanistic perspective. It is essential to integrate social-humanistic content into technical studies to inform and consider the broader consequences of technological development, including transhumanism. Fundamentally, further quantitative and qualitative research is needed to analyze the inclusion of social-humanistic content in technical studies and vice versa, with the goal of forming a practical counter to the transhumanist agenda within the education system. This is not about opposing technological progress, innovation, or the potential to improve living conditions, but about preventing the instrumentalization of life, the banalization of the sacred, and the reduction of humanity to mere biological data, subject to manipulation and stripped of its transcendent essence.

In addition to education, this research has shown that religiosity is a prominent dimension through which participants form their views on future scenarios of society and individuals under the influence of transhumanism. They expressed concerns about the dangers of *playing God* and undermining humanity as the image of God, while also disavowing the spiritual dimension of human existence in favor of projections of technological superiority. Interestingly, it wasn't only believers but also participants who identify as agnostics or atheists that took a critical stance. This highlights that the critical perspective on transhumanism draws on a wide range of arguments and profiles, as illustrated in the following graphic.

Field of expertise	Physical enhancement		Cognitive enhancement		Emotional enhancement		Life extension	
	Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages
Technical field	*Therapeutic purpose for normal functioning	*Financial unattainability *Social rejection *Injustice in sports	*Progress in cooperation with computer *Prevention of epilepsy	*Alienation of human being *Cybernetic person *Security issues *Mismatch with human nature	No advantage	*Emotional manipulation *Emotional reductionism *Dystopia *Creating technology addiction through artificial emotions	*Hope for a better life *Help and investment in health care	*Interference with the natural course of life *Social inequality *Perverse luxury *Economic exploitation of human dignity
Social-humanistic field	*Therapeutic purpose for normal functioning	*Economic inaccessibility *Social inequality *Danger of transhumanization *Sterile, lifeless atmosphere *Unpredictability of technology *Rejection of one's own identity	*Facilitated communication *Aid in certain diseases *Easier access to information	*Mind control *Alienation *Social inequality *Transformation of the human being *Hybridization *Loss of freedom and humanity *Transhumanization *Pathologization *Loss of thoughtfulness and spirituality *Playing Creator *Mental disorders *Dehumanization	*Enhancing emotional state *Treating negative emotions	*Robotization of human being *Individualization *Transhumanization *Technologization of society *Suppression of emotions *Unhealthy mood regulation *Disappearance of authenticity	*Medical use of the body *The potential of a preserved body	*Reduction of energy footprint *Overpopulation *Social inequality *The dominance of transhumans *Encouraging selfishness? *Loss of life meaning
Touchpoints	*Therapeutic purpose for normal functioning	*Financial inaccessibility *Social rejection	*Facilitated communication *Aid in certain diseases	*Alienation *Transformation of the human being *Transhumanization	-	*Transhumanization of society *Technological addiction *Emotional manipulation	*Help and investment in health care	*Social inequality *Economic exploitation of human dignity

Graph 1. Summary of the research findings on the advantages and disadvantages of the technologies studied from the perspective of the participants (N = 14)

Considering the research findings, a reductionist understanding of reality emerges, where transhumanism fits into the logic of the bioeconomic relationship to science, nature, and humanity, viewing humans as flexible biomaterial or bio-capital that can be manipulated like raw material. The principles of caution and responsibility have been replaced by the principle of innovation, which insists on the necessity of rapid human development and transformation. This biotechnicization and biomedicalization expand the concept of health, alter the understanding of humanity and dignity, and introduce new notions of the human body as something that should be extendable through extra-therapeutic interventions. It is a hard-scientific naturalism that confuses scientific progress with the possibility and desirability of radically metamorphosing the human species to achieve supernatural functions, ultimately leading to an irreversible technical captivity without therapeutic justification.

The complexity of living beings, however, demonstrates the mystery of life, which in every form is manifested in the fullness of symbols, or signs, but not signals. Therefore, we consider attempts to *desymbolize* life and *machinize* it as an expression of the loss of transcendence – whether social or religious. Accordingly, we understand efforts to desymbolize and mechanize life as expressions of a broader loss of transcendence, reflected in a one-dimensional, predominantly technical conception of the human person and society. The attempt to bring this transcendence down to the technical level through various enhancements inevitably results in disappointment with humanness. The danger of the transhumanist instrumental economy, especially through the cult of the (infinitely flexible) body, reflects a fundamental longing carried not by technique but by the various religious-moral traditions of human history. Therefore, it's necessary to have a dialogue between the various stakeholders of society, as well as the public and the academic community about the projections of (hyper)man, (post)society and (post) human future whose transhumanist face is visible in a technically sophisticated state of ongoing unfulfillment.

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