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PERSPECTIVE ARTICLE

Islamic Bioethics Viewpoint on Elective Brain Chip Implants and Brain-Computer Interfaces for Enhancing Academic Performance in Competitive Examinations

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Abstract

The first implantation of a brain chip into a human paralysis patient by Neuralink demonstrated much potential for treating debilitating neurological diseases and injuries. Nevertheless, brain chips can also be implanted in healthy people to provide an interface between the human brain with computers, robotic machines, and novel artificial intelligence platforms, which generates new ethical issues. The focus here is on the development of brain chip implants that can significantly improve memory, intelligence, and cognition, thereby boosting performance in national examinations for university admissions and securing civil service jobs, thus providing a "game-changer" and "shortcut" for many students and parents. Given that Islam is a major world religion, constituting a significant portion of the global population, it is crucial for the biomedical industry to comprehend Islamic perspectives on emerging medical technologies, which will enable it to more effectively cater to a substantial and growing demographic. We thus critically examine whether the application of brain chip technology to enhance academic performance in highly competitive examinations is consistent with Islamic principles. Based on the Islamic jurisprudential framework, such an application for intellectual enhancement of normal and healthy people without any mental impairment may conflict with the injunction to preserve intellect (*Hifz al-Aql*) and "consideration of consequences" (*murā'āt al-ma'ālāt*) in Islam. It may also be viewed as tampering with Allah's creation (*Taghyir Khalq Allah*). Gaining such unfair advantages in competitive examinations will likely be viewed as unethical, by transgressing the core Islamic precepts of *Amanah* (trustworthiness), *Al-'Adl* (justice), *Ikhlas* (sincerity), and *Mujahadah* (striving).

Keywords Cognitive enhancement · Fatwa · Memory · Brain microchip · Muslims

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Introduction

In a recent ground-breaking clinical trial that heralded much hope for patients suffering from debilitating neurological defects due to brain/spinal cord injury or neurodegenerative diseases, the first brain chip was implanted into a human paralysis patient, which reportedly enabled him to play chess via the establishment of a brain-computer interface (Al-Arshani 2024). Neuralink, the start-up company that pioneered this 'brain-computer interface', is now reportedly seeking more volunteers for further clinical trials of this nascent technology platform (Paul 2024). Besides helping patients afflicted with neurological defects and disorders, it must be noted that brain chips can also be implanted in healthy people to enhance their memory and cognition, as well as connect the human mind to computers, robotic machines, and novel artificial intelligence platforms, which in turn brings up a whole host of new ethical issues (Drew 2024; Krämer 2024). While this nascent technology platform certainly has many potential beneficial applications for humanity, it can also be abused for various harmful purposes. For example, in war and terrorist attacks, whereby flying drones and tunnel-crawling robots can be controlled via brain-computer-machine interfaces established through brain chip implants.

As Islam is a major world religion, with approximately 2 billion Muslims comprising about a quarter of the global population (Zouiten 2023), it is crucial for the biomedical industry to understand Islamic perspectives on emerging medical technologies. Such understanding not only facilitates ethical engagement, respecting cultural and religious sensitivities, but also enhances the industry's ability to serve this significant demographic and achieve commercial success within this large potential customer base. Brain chip technology may offer a novel avenue for improving human intellectual capacity and mental performance. From an Islamic perspective, developing and enhancing one's intellect and using it for beneficial purposes is highly esteemed. This is especially true when it involves alleviating pain, eliminating harm, improving quality of life or assisting those in need. The Quran repeatedly emphasizes the importance of employing human intellect and reason to benefit humanity, as highlighted in several verses such as Al-An'am 6:151, Yunus 10:101, and Az-Zukhruf 43:3 (Mat Akhir and Sabjan 2015).

The focus here is on the development of brain chips and brain-computer interfaces that can significantly enhance cognition and memory, which in turn can boost performance in challenging national examinations for university admissions or for obtaining civil service jobs (Chin et al. 2024). Currently, brain chip implants are still at a very nascent stage of development, with the first human recipient patient undergoing a clinical trial in 2024 (Al-Arshani 2024). Nevertheless, it is plausible to hypothesize that in the future, brain chip implants can enhance cognitive ability and memory via two mechanisms. First, brain chip implants can be used to provide electrical stimulation to enhance neural growth and interconnectivity within specific parts of the brain associated with cognition and memory, such as the frontal lobe (Chayer and Freedman 2001), hippocampus (Opitz 2014), and amygdala (Roesler et al. 2021). Indeed, previous studies have

conclusively demonstrated that electrical stimulation can improve cognitive performance and memory in both human subjects (Kucewicz et al. 2023; Elmasry et al. 2015) and experimental animal models (Liu et al. 2015; Shirvalkar et al. 2006). Second, the implanted brain chip can directly form a brain-computer interface (Valencia et al. 2019), with the brain chip itself incorporating a microcomputer. Biochemical and electrochemical data relayed to the human brain from sensory organs such as the eye and ear can then be directly processed and stored by implanted brain chips, resulting in enhanced cognitive performance and memory. Whatever the case, brain chip implants for improving cognitive performance and memory must be based on valid scientific evidence and rigorous data, before regulatory approval is given for widespread application in human patients. Indeed, this principle is upheld by the Islamic legal maxim concerning the principle of certainty (*Yaqin*), '*Al-yaqin la yazalu bi al-syakk*' for neurological applications (Aziz et al. 2024).

The pertinent question is how would this align with Islamic principles and ethics? It is widely acknowledged that some examinations are exceedingly competitive, often demanding extensive years of dedicated study and preparation. Notable examples include the extremely difficult college entrance examinations, referred to as Gaokao, in China (Chen et al. 2022), and the highly rigorous civil service examinations overseen by the United Public Service Commission (UPSC) in India. The advent of brain chip technology may thus represent a "game-changer" and "shortcut" to achieve academic success in such competitive and highly grueling examinations for many students and parents.

After all, parents instinctively love their children and desire the best future for them. Therefore, it is anticipated that regardless of how expensive brain chip implants are, there will always be a ready market if these have been positively demonstrated to significantly improve academic performance in competitive examinations. Indeed, the news media have reported numerous instances of parents administering "smart drugs" like Ritalin, Modafinil, and Adderall to their children in an attempt to enhance academic performance in competitive examinations, despite their health-damaging side effects (Sattler et al. 2021).

Consideration of Consequences (*al-ma'ālāt*) in Islamic Jurisprudence

Before engaging in the ethical discourse surrounding brain chip technology, it is crucial to comprehend the foundational areas it affects, particularly the question of whether such advancements will displace or undermine human intellect (*al-ʿaql*). In Islamic theology, intellect is regarded as a unique gift from Allah, characterized not just by cognitive functions but also by its intrinsic connection to the heart (*al-qalb*), influencing moral choices and emotional responses. This distinguishes human intellect from artificial intelligence (AI), which operates devoid of empathy, emotional intelligence, and moral judgment.

A pressing concern is the potential for brain chip technology and other AI platforms to significantly alter or diminish human intellectual capacity. For example, the widespread use of AI-driven tools such as ChatGPT for various tasks has already

raised concerns about fostering intellectual laziness, diminishing creativity, and creating over-reliance on technology. Such developments could lead to the erosion of the human mind's unique potential, which runs counter to the Islamic principle of *Hifẓ al-ʿaql* (preservation of intellect). Islam emphasizes the preservation and cultivation of the intellect as an essential component of one's duty to Allah, and reliance on external enhancements like brain chips could weaken this divine faculty. Moreover, this technological shift challenges the concept of *shukr* (gratitude). In Islam, gratitude for the blessing of intellect is expressed through its diligent use and continuous development. Failing to actively engage and enhance one's intellectual abilities, and instead relying on artificial enhancements, could be seen as neglecting this form of gratitude.

In Islamic jurisprudence, the principle of "consideration of consequences" (*murāʿāt al-maʾālāt*) plays a vital role in determining the permissibility of actions. When deriving rulings (Al-Masri and Iqbal 2019; Ishak 2018), this principle emphasizes that the outcomes and long-term effects of actions or decisions must be taken into account when determining their permissibility or prohibition in Islamic law. It ensures that the potential benefits and harms, both immediate and future, are considered in the formulation of rulings, thus preventing unintended negative consequences. This principle requires that the potential long-term impacts of brain chip technology on human intellect, creativity, and moral agency be thoroughly examined before making any ethical rulings. The profound consequences of such technology on the preservation of intellect and its alignment with Islamic values must therefore be carefully weighed before widespread adoption or acceptance.

Because the implantation of brain chips involves invasive neurosurgery, and there is always a risk of device malfunction after implantation, various pertinent safety issues need to be addressed before regulatory approval for widespread clinical applications. It is important to note that elective brain chip implantation, intended for cognitive and memory enhancement, does not serve to address any existing mental or physical disabilities, but rather aims to augment the abilities of otherwise healthy individuals. Consequently, it lacks the justification typically invoked under the principle of medical necessity (*ḍarūrah*), as there is no pressing medical need or treatment rationale that would warrant its permissibility from an Islamic perspective. In addition, the safety and ethical standards, along with the management of medical risks, must be maintained at significantly higher and more stringent levels compared to therapeutic applications. This is particularly relevant for patients without any health issues seeking enhancement, who have much more to lose and less to gain, in line with the principle of proportionality in bioethics (Hermerén 2012), which asserts that the rigor of any regulatory or governance framework should correspond to the risks being addressed. This position aligns with the Islamic legal maxim "warding off harm takes precedence over acquiring benefits." According to this principle, if a given action, such as elective brain chip implantation, carries potential harms that outweigh its benefits—such as negative consequences for human intellect or well-being—it should be avoided, even if it offers some advantages.

The Ends do Not Justify the Means in Islam

While parents' love for their children and their corresponding efforts and sacrifices to ensure the best future for their children is commendable, they do not justify the ethical principles of Islam if dishonest and unfair methods are used to achieve such objectives, regardless of how noble and lofty they are. The Prophetic tradition (*Hadīth*), "No father has given a gift to his child better than good manners" (*Sunan al-Tirmidhī, Ḥadīth 1952*), underscores that the most valuable gift parents can offer their children is not material wealth or possessions, but rather the cultivation of good character and moral values. This highlights the Islamic emphasis on ethical upbringing as a crucial aspect of a child's development.

This is well-supported by various sources in Islamic teachings. In the Qur'an, *Surah Al-Baqarah* (2:188) explicitly states, "And do not consume one another's wealth unjustly or send it [in bribery] to the rulers in order that [they might aid] you [to] consume a portion of the wealth of the people in sin, while you know [it is unlawful]," emphasizing that engaging in unjust practices, such as bribery, is prohibited regardless of the intended outcome. Support for this maxim can also be found in the sayings of the Prophet Muhammad (peace be upon him). In *Sahih Bukhari* (*Hadith 6130*), it is narrated, "Whoever deceives us is not one of us," underscoring the rejection of deceitful practices even for seemingly good purposes. Furthermore, in *Sunan Ibn Majah* (*Hadith 4243*), the Prophet said, "Indeed, actions are judged by intentions, and for every person is what he intended," indicating that the legitimacy of an action is not solely based on its intended outcome but also on the means employed. Lastly, *Sahih Muslim* (*Hadith 184*0) reinforces this principle by stating, "There is no obedience to a created being in disobedience to the Creator," which means that one should not follow the commands or wishes of any person or authority if doing so conflicts with the commands of Allah (the Creator). Together, these verses from the Quran and Hadiths illustrate the critical importance of adhering to ethical standards and lawful means in all endeavors.

Perhaps an analogy can be drawn with the near-universal ban on performance-enhancing drugs by international sporting organizations to ensure fair play and a level playing field for athletes. In this scenario, the unfair advantages gained by athletes using performance-enhancing drugs such as anabolic steroids, are directly analogous to the unfair advantages gained by an examination candidate through brain chip implantation, which would thus subvert the meritocratic principles of these sports competitions and examinations respectively. If only the rich could afford brain chip implants that enhance their performance in national competitive examinations, this would certainly raise widespread concerns about the fairness of the selection process for university admissions and government posts, thereby diminishing public confidence and trust in key national institutions (Chin et al. 2024). Indeed, there would be a gross transgression of the core Islamic precepts of *Amanah* (trustworthiness), *Al- 'Adl* (justice), *Ikhlas* (sincerity) and *Mujahadah* (striving) (Shuhari et al. 2019; Al-Khatib 2023), if only a select few examination candidates from rich families can gain unfair advantages via brain chip implantation.

In Islam, it is not just the objectives that matter, with equal or even greater emphasis being placed on the means and paths of reaching objectives. Although Islam is widely perceived to be a religion that is focused and centered on the worship of one God, it is holistically also equally focused and centered on humanity, as it aims to develop and improve mankind at both the individual and societal levels. Indeed, Islam is a comprehensive worldview and way of living focused on guiding individuals to get closer to the One True God (Muhsin et al. 2024; Hude and Saihu 2024). It considers human beings as central figures among all creations, deeming them as *Khalifah* (vicegerents of God) and entrusting them with the *Amanah* (the trust) (Shuhari et al. 2019). Therefore, Islam provides humanity with a roadmap and practical steps for both personal and societal development and improvement through its rigorous framework of ethics (*Akhlaq*) (Muhsin et al. 2024; Hude and Saihu 2024) and Islamic Code of Conduct (*Shariah*) (Hassan 2019). Islam not only provides instructions about goals and objectives, but it also offers detailed guidance on the means, methods, tools, and paths to achieve them.

This is why the means and path to reaching objectives are so strongly emphasized in Islam, more so than the objectives themselves. Because an individual gains dignity, self-esteem, and a sense of achievement during the process of struggling and overcoming life's adversities ethically and righteously. Islam perceives the mortal life of an individual as a journey, during which he/she will be tested by God along the way, and if found worthy, will be granted the reward of paradise (*Jannah*). It is through *Mujahadah* (striving) that one is uplifted and empowered upon encountering the various trials and tribulations of life. Whether or not a person reaches his or her desired objectives during this lifetime journey is uncertain and subject to the will of Allah. Nevertheless, what really matters is to follow the righteous path and overcome challenges in an ethical manner during one's mortal life journey, not only to be worthy of the ultimate reward of paradise but because by doing so, one's station in life is developed and improved holistically along the way, at both the material and spiritual level. Take for example religious obligations in Islam such as the *Hajj* (pilgrimage). While outwardly, the end goal of the *Hajj* is to worship Allah at the *Ka'abah*, many Muslims must save a lifetime to perform this religious obligation. Some may die young, so there is no absolute certainty in being able to fulfill their *Hajj* obligation. Nevertheless, in the process of saving for the *Hajj*, individual Muslims learn the values of thrift, financial prudence, and diligence. If anyone attempts to fulfill this costly obligation by unethical means such as cheating or theft, then their act is not accepted, and their character is not improved in the process. Similarly, if a brain chip is developed to enable one to instantaneously memorize all verses of the Quran, then this would be devoid of any spiritual value. On the other hand, a dedicated Islamic scholar who spends a lifetime memorizing the entire Quran (*Hafiz*) manually through sheer hard work and determination would gain a much deeper understanding and spiritual insight into the nuances of each

verse. Muslims believe that Allah offers rewards for the attempts and efforts one makes in His way.

Brain Chip Implants may Conflict with the Injunction to Preserve and Maintain Intellect (*Hifz al-Aql*) in Islam

The preservation of intellect (*Hifz al-Aql*) is one of the five higher objectives of Shariah law (*Maqasid Al-Shariah*) (El-Mesawi 2020; El-Mesawi et al. 2022) and holds a significant position among scholars of Islamic legal theory (*Usul al-Fiqh*), typically ranking third after the preservation of religion (*Hifz al-Din*) and preservation of life (*Hifz al-Nafs*), but usually given priority over the preservation of lineage (*Hifz al-Nasl*) and preservation of wealth (*Hifz al-Mal*). However, some scholars convincingly argue that this order does not accurately represent the relationship among the *Maqasid*. They contend that these objectives are interconnected and complement one another, with each one relying on the others to function effectively and achieve their intended purposes. It emerges as a natural implication of these foundational principles of *Shariah*. The Quran employs a rich vocabulary to convey various dimensions and levels of cognition, encompassing perception, recollection, reasoning, contemplation, and more (El-Mesawi et al. 2022).

Human intellect (*Aql*) is a distinct human capability that sets us apart from animals. It improves life quality, safety, living standards, community welfare, and ecological balance. Islam values innovation, originality, and excellence in believers' duties, aligning with our stewardship of the Earth (Quran, Hūd: 61). Innovation reflects the advanced thinking and visionary mindset of a creative society. It requires intellectual capacity to invent or discover for the public good, without mere imitation. Human intellect, entrusted by Allah, serves a purpose: to fulfill righteous stewardship, sincere servitude, and the fulfillment of entrusted responsibilities (*Amānah*). It is meant for thinking, reflecting, understanding, planning, guiding, solving, and acknowledging, all grounded in the concept of *Tawhid*—the recognition of Allah's unity and supreme authority (ibn Ashur 2006).

Using one's intellect (*ʿaqala*) is emphasized in the Quran 46 times, alongside the question "Do you think," which appears 13 times. This highlights the importance of preserving intellect (*Hifẓ al-Aql*), a key objective of *Shariah*. Islam encourages competition in doing good and excelling in creative endeavors. A person cannot succeed in such competition by limiting themselves to imitation and routine activities. Allah urges believers to compete in goodness, as stated in the Quran: "So, compete with one another in doing good" (*Surah al-Baqarah:* verse 148) and "Those who wish to excel above others, let them endeavor to excel in this" (*Surah Al-Muṭaffifin:* verse 26). This competition and pursuit of excellence are investments that yield rewards in both worlds (ibn Ashur 2006).

Intellect (*Aql*) is fundamentally contrasted with ignorance (*Jahl*), which represents its antithesis. It stands in opposition to foolishness and stupidity, embodying

humanity's capacity to comprehend, retain knowledge, and exercise self-control to avoid blameworthy inclinations. *Naql*, synonymous with knowledge, encompasses the innate capacity of individuals to acquire knowledge and the knowledge itself obtained through the principles of this capacity. According to Abū al-Maʿālī al-Juwaynī, intellect (*Aql*) comprises essential elements of foundational knowledge (*ʿUlūm ḥaḍāriyyah)* that define and distinguish a rational individual (*ʿAqil*), which enables one to perceive the necessity of what is necessary, the impossibility of what is impossible, and the possibility of what is possible (El-Mesawi et al. 2022).

The Quran expounds that reason and rationality are seamlessly integrated with sensory perception, including physical senses like sight (*Baṣar/Abṣār*) and hearing (*Samʿ*). The frequent pairing of these senses in Quranic verses, both concerning human beings and their relation to God, highlights their paramount importance and function. These senses play a pivotal role in human cognition and the acquisition of knowledge, emphasizing their indispensable contribution to understanding and perceiving the world (El-Mesawi et al. 2022).

Hence, due to the paramount importance that Islam places on the preservation and maintenance of intellect (*Hifz al-Aql*), intoxicating and mind-altering psychoactive substances such as alcohol and psychedelic drugs are thus banned, together with addictive activities such as gambling, as these are deemed to impair one's rational judgment and moral reasoning. The Quran succinctly addresses the issue of alcoholism and gambling, offering profound insights for reflective minds and conscientious individuals. In Surah Al-Baqarah (verse 219), it provides a concise and compelling perspective (El-Mesawi et al. 2022). *Khamr*, derived from the verb "*Khamara*" meaning to conceal and obscure, carries the lexical meaning of "every substance that obscures the intellect" (El-Mesawi et al. 2022). Hence, the rationale for prohibiting intoxicants in Islam, whether alcoholic beverages or other substances, is their ability to inebriate the mind, leading to its veiling and impairment (El-Mesawi et al. 2022).

Preserving the intellect thus entails safeguarding people's minds from influences that disrupt their functioning. Any impairment of the intellect can lead to significant corruption, resulting in improper and perverted behavior. Individual lapses in intellect lead to partial corruption and wrongdoing, while widespread impairment within a community can result in widespread devastation and evil (ibn Ashur 2006). It is only by preserving one's intellect that one can exercise free will based on well-weighted judgment, which represents the foundation of one's moral responsibility and accountability before Allah. There is a strong risk that brain chip implants might exert mind-altering and psychoactive effects, thereby being tantamount to intoxication, which would in turn impair one's moral judgment. Currently, there is still much unknown about this emerging technology platform (Chin et al. 2024). Can brain chips that can be inserted to improve memory and intelligence also have a damaging effect in the long term on a person's personality and behavior? For example, the augmentation of intellectual capacity with brain chips could lead to increased arrogance and domineering personality traits, which might result in antisocial tendencies (Chin et al. 2024). The key issue of contention here is whether the person has control over the implanted brain chip or it controls the person. Hence, if the person is unable to

fully control the implanted brain chip, it may be tantamount to intoxication. However, if the person can fully control it, that would indicate that the person is still accountable for his or her actions and should be held liable for any legal process like any other person, which aligns with the principle of *Qasd* (intention) that holds individuals responsible for deliberate actions. Nevertheless, if a brain chip was to hinder or externally affect a person's intellect (*Al-ʿaql*) or their capacity for communication (*Fahm al-khiṭāb*), it could consequently modify their legal status of being obligated (*Mukallaf*). In case a person's brain implant is being managed or controlled by external parties, then the other party should partially or fully bear legal responsibility for any aberrant behavior or action by that person.

Brain Chip Implants may be Tantamount to Tampering with God's Creation (*Taghyir Khalq Allah*)

In Islam, one's own physical body is not one's personal property but is deemed to belong to Allah. Hence, modifying one's body for the sake of vanity without any pressing medical need, such as cosmetic surgery is forbidden in Islam (Hamdan et al. 2021), as that would be tantamount to tampering with Allah's creation (*Taghyir Khalq Allah*). This would similarly apply to brain chip implantation to enhance intelligence and memory when one is not suffering from neurological deficiency due to brain and spinal cord injury or neurodegenerative diseases. This is particularly significant in cases where children/minors are candidates for the implantation of brain chips to improve their academic performance in standardized tests and examinations, as parents will largely be the decision-makers (Reynolds et al. 2017; Rodríguez-Domínguez et al. 2023). In such a scenario, the aspects of informed consent and the personal autonomy of minors need to be thoroughly deliberated (Bello 2010; Díaz-Pérez et al. 2020). Because there is no pressing or dire medical need in this case, the question of parents trespassing on their child's autonomy and exercising undue influence on their child's consent would be a more contentious issue, as compared to deciding on essential health or life-saving treatments for their child. Hence, it is critical to ensure that the decision to implant a brain chip respects the child's autonomy and that informed consent is obtained from the child, regardless of age and maturity (Osuna 2010). Parents must carefully consider the ethical implications and the long-term impact on the child's well-being and development, which may in turn require comprehensive and rigorous counseling by qualified professionals. In Islamic jurisprudential tradition, children are deemed to be incapable of making major decisions in their lives and are not held fully accountable for their actions until they reach the age of puberty. From the viewpoint of Islamic bioethics, minors are not regarded as *Mukallaf* (legally accountable) due to their inability to fully understand and intend obedience (Catic 2023). Based on this tradition, brain chip implantation for non-medical purposes should ideally be prohibited for children before the age of puberty, regardless of their wishes and those of their parents.

Brain Chip Implants will Likely Increase Social Inequality

In Islam, avoiding harm takes precedence over seeking benefits from medical treatment. Besides obvious medical risks at the individual level, there are also potential harms of brain chip implants at the societal level (*Mafsadah*). These would probably exacerbate social inequality and expand the divide between the affluent and the impoverished. Because brain chips that can enhance academic performance in competitive examinations are anticipated to be in high demand worldwide, this would thus create a highly lucrative market (Chin et al. 2024). Prices for such brain chips are expected to be very high and affordable only to the rich because it is imperative for tech companies that have developed such products to recover the substantial investments of time, money, and effort that have already been allocated to the research and development process (Chin et al. 2024). Indeed, they will be deeply beholden to their shareholders to increase profitability by taking advantage of their exclusive patent rights and the strong market demand for these brain chips. Moreover, there are also additional medical fees for complex implantation surgery that would require the expertise of a highly skilled neurosurgeon.

All these would thus imply that only the rich will be able to afford implantable brain chips for enhancing their academic performance in competitive examinations, which is bound to generate much controversy among government policymakers, educators, parents, students, and society at large. This could lead to an inequitable educational landscape, fostering social divisions and perpetuating injustice. According to the Islamic ethics (*Akhlaq*) point of view, it is imperative to ensure that such technology does not harm society or create unfairness. The principle of "*la darar wa la dirar*," which translates to "do not harm and do not reciprocate harm," underscores the ethical imperative to avoid actions that cause unfair advantage or societal harm. The use of brain chip implants for enhancing performance in competitive examinations would likely result in significant disparities, providing some with an undue advantage while disadvantaging others.

This would thus be contrary and inimical to the highly cherished concept of social justice by the global Muslim community (Al-Khatib 2023; Khan 2020). The Arabic term that most accurately encapsulates the concept of social justice in the Qur'an is "*Qisṭ*", which denotes fairness. This term embodies the principles of equality and justice in the distribution of resources and mandates the global Muslim community to ensure that every individual in society obtains their rightful share (Al-Khatib 2023; Khan 2020). The *Sunnah* of the Prophet Muhammad further reinforces the concept of social justice through his teachings and actions. In his Farewell Sermon, he proclaimed, "All mankind is descended from Adam and Eve. An Arab has no superiority over a non-Arab, nor does a non-Arab have any superiority over an Arab; a white has no superiority over a black, nor does a black have any superiority over a white; none have superiority over another except by piety and good action" (Sunan Abi Dawood, Hadith 4092). This declaration clearly articulates that moral character and piety, rather than wealth, ability, ethnic or racial identity, determines a person's worth in the eyes of Allah. The Prophet's emphasis on the importance of community and collective responsibility is evident

in various *Haditha*, which encourage Muslims to support and care for one another, regardless of their backgrounds. For example, he said, "The believers, in their mutual kindness, compassion, and sympathy, are like one body; when one part of the body feels pain, the whole body feels pain" (*Sahih Muslim*, *Hadith* 2586). This highlights the interconnectedness of all individuals and the obligation to work towards a just and equitable society.

Besides exacerbating socioeconomic disparities, brain chip technology will likely change the focus of education from self-cultivation and knowledge-seeking to technological advantages. The fundamental essence of education in nurturing one's personal growth and development, knowledge-seeking motivated by natural curiosity and fostering life-long learning will be altered, turning it into a vainglorious "rat race" whereby parents and students compete for the most novel and technologically sophisticated gadgetry that can be bought with money. Worse still, over-reliance on such technology may stunt the development of creative and critical-thinking skills among students, by diminishing their motivation for self-improvement and lifelong learning, while also undermining timeless values of integrity, diligence, and perseverance in education (Chin et al. 2024) .

Critical Reflections and Future Perspectives

Intention (*Qasd*) and necessity (*Darūra*) play significant roles in determining Islamic viewpoints on new medical technology platforms. As the famous *hadith* (prophetic tradition) narrated by *Al-Bukhari* states, "Actions are judged according to intentions." Therefore, the intention behind using a new technology is crucial in Islam, together with the necessity of doing so. If brain chips are used to gain unfair advantages in competitive exams or job markets, they will likely be viewed as unethical and unnecessary by the overwhelming majority of Islamic scholars and jurists. However, if the intention is to overcome cognitive impairments or disabilities, it is likely to be more widely accepted, as this aligns with Islamic principles of compassion and care for the sick and vulnerable. The safeguarding of health, known as *Hifz al-Sihhah*, is regarded as a primary obligation within Islam. The principle of necessity, or *Darūrah*, stipulates that therapeutic interventions or biomedical implants must be essential for the maintenance of life or health (Ibrahim 2023). Additionally, Islamic medical ethics make a clear distinction between enhancement (*Tahsin*) and modification (*Taghyir*) (Ibrahim 2023). While enhancement may be permissible in specific situations, radical alterations to a healthy individual's physical or mental state could present ethical dilemmas. For example, enhancing one's athletic ability through better nutrition and taking vitamin supplements is widely accepted, but radical modification with bionic implants would likely be considered unethical by international sporting organizations. The implementation of brain chips to improve academic performance in competitive examinations should therefore be assessed in this light. As stated by Professor Isa Ali Ibrahim (Pantami) at the Second International Conference of the UAE Council for Fatwa that was held in Abu Dhabi in November 2023, "Smart chip implants in the human body for mere luxury and socialization without any sickness or necessity is

not permissible. However, smart chip implants for healthcare, security, necessity or other *Maslahah* (benefits), is permissible" (Ibrahim 2023).

Therefore, while we consider and applaud the positive impacts and results of brain chips within the medical field, we should not overlook the potential for abuse. It is therefore crucial to develop comprehensive rules and regulations to prevent any potential misuse of this groundbreaking technology. Ensuring strict compliance with ethical guidelines and regulatory safeguards will help protect individuals and society from possible adverse effects of abuse of this nascent technology platform.

Declarations

Ethics Approval No human subjects or animals were involved in the study.

Conflict of Interest The authors declare no competing interests.

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